



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**NOTICE TO BIDDERS
AND
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN ORANGE COUNTY FROM 0.4
MILE NORTH OF CAMINO DE ESTRELLA OVERCROSSING TO 0.2 MILE
SOUTH OF SAN JUAN CREEK ROAD UNDERCROSSING**

In District 12 On Route 5

Under

Bid book dated August 19, 2013

Standard Specifications dated 2010

Project plans approved April 29, 2013

Standard Plans dated 2010

Identified by

Contract No. 12-0F96E4

12-Ora-5-6.2/8.7

Project ID 1200020279

Federal-Aid Project

CMLN-6212(014)

Electronic Advertising Contract

**Bids open Thursday, October 17, 2013
Dated August 19, 2013**

**OSD
IH**

SPECIAL NOTICES

- For federal-aid projects, the Department is modifying its DBE program.

CONTRACT NO. **12-0F96E4**

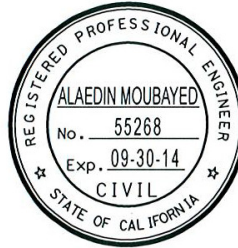
DESIGN OVERSIGHT APPROVAL	REGISTRATION NO.	DATE
PRINTED NAME KAMRAN MAZHAR	SIGNATURE  C48436	1/16/2013

Approved as to impact on State facilities and conformance with applicable State standards and practices as described in the A & E Consultant Services Manual.

The special provisions contained herein have been prepared by or under the direction of the following Registered Persons.

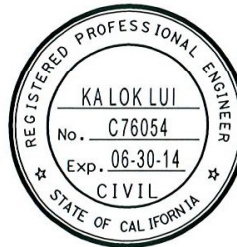
STRUCTURES


REGISTERED CIVIL ENGINEER



HIGHWAY


REGISTERED CIVIL ENGINEER



TRAFFIC


REGISTERED CIVIL ENGINEER



CONTRACT NO. **12-0F96E4**

The special provisions contained herein have been prepared by or
under the direction of the following Registered Persons.

LANDSCAPE



REGISTERED LANDSCAPE ARCHITECT



ELECTRICAL



REGISTERED CIVIL ENGINEER

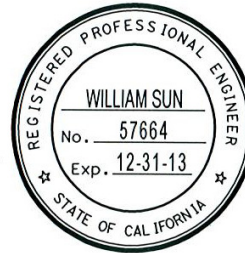


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A87B	Hot Mix Asphalt Dikes
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P2	Jointed Plain Concrete Pavement - Widened Slab Details
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S6	Overhead Signs - Truss, Gusset Plate Details
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ES-15D	Electrical Systems (Lighting and Sign Illumination Control)
ES-16B	Electrical Systems (Closed Circuit Television, 25' to 45' Pole)

CANCELED STANDARD PLANS LIST

The standard plan sheets listed below are canceled and not applicable to this contract.

B3-1	Canceled on April 20, 2012
B3-2	Canceled on April 20, 2012
B3-3	Canceled on April 20, 2012
B3-4	Canceled on April 20, 2012
B3-7	Canceled on April 20, 2012
B3-8	Canceled on April 20, 2012
ES-8	Canceled on January 20, 2012
ES-10	Canceled on July 20, 2012

NOTICE TO BIDDERS

Bids open Thursday, October 17, 2013

Dated August 19, 2013

General work description: Construct HOV lane. Reconstruct Ramps and Structures Widening,

The Department will receive sealed bids for CONSTRUCTION ON STATE HIGHWAY IN ORANGE COUNTY FROM 0.4 MILE NORTH OF CAMINO DE ESTRELLA OVERCROSSING TO 0.2 MILE SOUTH OF SAN JUAN CREEK ROAD UNDERCROSSING.

District-County-Route-Post Mile: 12-Ora-5-6.2/8.7

Contract No. 12-0F96E4

The Contractor must have either a Class A license or a combination of Class C licenses which constitutes a majority of the work.

The DBE Contract goal is 9 percent.

Federal-aid project no.:

CMLN-6212(014)

Bids must be on a unit price basis.

Complete the work, excluding plant establishment work, within 500 working days.

Complete the work, including plant establishment work, within 750 working days.

Complete the plant establishment work within 250 working days.

The estimated cost of the project is \$41,000,000.

A prebid meeting is scheduled for , , at . The purpose of the prebid meeting is to

The Department will receive bids until 2:00 p.m. on the bid open date at 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692. Bids received after this time will not be accepted.

The Department will open and publicly read the bids at the above location immediately after the specified closing time.

District office addresses are provided in the *Standard Specifications*.

Present bidders' inquiries to the Department and view the Department's responses at:

http://www.dot.ca.gov/hq/esc/oe/project_status/bid_inq.html

Questions about alleged patent ambiguity of the plans, specifications, or estimate must be asked before bid opening. After bid opening, the Department does not consider these questions as bid protests.

Submit your bid with bidder's security equal to at least 10 percent of the bid.

Prevailing wages are required on this Contract. The Director of the California Department of Industrial Relations determines the general prevailing wage rates. Obtain the wage rates at the DIR Web site, <http://www.dir.ca.gov>, or from the Department's Labor Compliance Office of the district in which the work is located.

The federal minimum wage rates for this Contract as determined by the United States Secretary of Labor are available at <http://www.dot.ca.gov/hq/esc/oe/federal-wages>.

If the minimum wage rates as determined by the United States Secretary of Labor differs from the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors must not pay less than the higher wage rate. The Department does not accept lower State wage rates not specifically included in the federal minimum wage determinations. This includes helper, or other classifications based on hours of experience, or any other classification not appearing in the federal wage determinations. Where federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors must not pay less than the federal minimum wage rate that most closely approximates the duties of the employees in question.

The Department has made available Notices of Suspension and Proposed Debarment from the Federal Highway Administration. For a copy of the notices, go to http://www.dot.ca.gov/hq/esc/oe/contractor_info. Additional information is provided in the Excluded Parties List System at <https://www.epls.gov>.

Department of Transportation

KM

BID ITEM LIST

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
1	070030	LEAD COMPLIANCE PLAN	LS	LUMP SUM
2	080050	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
3	090100	TIME-RELATED OVERHEAD (WDAY)	WDAY	500
4	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
5	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
6	120120	TYPE III BARRICADE	EA	44
7	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	1,110
8	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	168,000
9	120165	CHANNELIZER (SURFACE MOUNTED)	EA	140
10	120300	TEMPORARY PAVEMENT MARKER	EA	9,560
11	025702	SIGNAL AND LIGHTING (STAGE CONSTRUCTION) (LOCATION 1)	LS	LUMP SUM
12	128651	PORTABLE CHANGEABLE MESSAGE SIGN (EA)	EA	27
13	129000	TEMPORARY RAILING (TYPE K)	LF	40,700
14	129100	TEMPORARY CRASH CUSHION MODULE	EA	300
15	129150	TEMPORARY TRAFFIC SCREEN	LF	28,600
16	130100	JOB SITE MANAGEMENT	LS	LUMP SUM
17	130300	PREPARE STORM WATER POLLUTION PREVENTIONPLAN	LS	LUMP SUM
18	130310	RAIN EVENT ACTION PLAN	EA	48
19	130320	STORM WATER SAMPLING AND ANALYSIS DAY	EA	48
20	130330	STORM WATER ANNUAL REPORT	EA	2

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21	130520	TEMPORARY HYDRAULIC MULCH	SQYD	29,500
22	130610	TEMPORARY CHECK DAM	LF	620
23	130620	TEMPORARY DRAINAGE INLET PROTECTION	EA	140
24	130640	TEMPORARY FIBER ROLL	LF	5,770
25	130650	TEMPORARY GRAVEL BAG BERM	LF	11,400
26	130660	TEMPORARY LARGE SEDIMENT BARRIER	LF	2,070
27	130680	TEMPORARY SILT FENCE	LF	3,420
28	130710	TEMPORARY CONSTRUCTION ENTRANCE	EA	11
29	130730	STREET SWEEPING	LS	LUMP SUM
30	130900	TEMPORARY CONCRETE WASHOUT	LS	LUMP SUM
31	141000	TEMPORARY FENCE (TYPE ESA)	LF	3,020
32	141103	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE (HAZARDOUS WASTE)	LF	5,270
33	141120	TREATED WOOD WASTE	LB	28,500
34	150221	ABANDON INLET	EA	14
35	150227	ABANDON PIPELINE	EA	20
36	150608	REMOVE CHAIN LINK FENCE	LF	770
37	150662	REMOVE METAL BEAM GUARD RAILING	LF	1,770
38	150685	REMOVE IRRIGATION FACILITY	LS	LUMP SUM
39	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	107,000
40	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	3,010

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	150722	REMOVE PAVEMENT MARKER	EA	12,000
42	150742	REMOVE ROADSIDE SIGN	EA	35
43	150747	REMOVE ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	7
44	150748	REMOVE ROADSIDE SIGN PANEL	EA	1
45	150757	REMOVE SIGN STRUCTURE (EA)	EA	5
46	150767	REMOVE BRIDGE MOUNTED SIGN	EA	1
47	150770	REMOVE ASPHALT CONCRETE PAVEMENT (SQFT)	SQFT	50,200
48	150771	REMOVE ASPHALT CONCRETE DIKE	LF	510
49	150812	REMOVE PIPE (LF)	LF	560
50	150820	REMOVE INLET	EA	27
51	150832	REMOVE RETAINING WALL (CY)	CY	66
52	150836	REMOVE RETAINING WALL (LS)	LS	LUMP SUM
53	150839	REMOVE RETAINING WALL (PORTION) (LS)	LS	LUMP SUM
54	150853	REMOVE CONCRETE PAVEMENT (SQYD)	SQYD	9,420
55	152390	RELOCATE ROADSIDE SIGN	EA	20
56	152430	ADJUST INLET	EA	3
57	152641	MODIFY SIGN STRUCTURE	EA	10
58	153130	REMOVE CONCRETE CURB (LF)	LF	2,600
59	153221	REMOVE CONCRETE BARRIER	LF	5,970
60	153248	REMOVE CONCRETE (MISCELLANEOUS) (SQFT)	SQFT	36,400

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61	153253	REMOVE SOUND WALL (SQFT)	SQFT	26,400
62	155003	CAP INLET	EA	1
63	155232	SAND BACKFILL	CY	200
64	157561	BRIDGE REMOVAL (PORTION), LOCATION A	LS	LUMP SUM
65	157562	BRIDGE REMOVAL (PORTION), LOCATION B	LS	LUMP SUM
66	157563	BRIDGE REMOVAL (PORTION), LOCATION C	LS	LUMP SUM
67	160102	CLEARING AND GRUBBING (LS)	LS	LUMP SUM
68	190101	ROADWAY EXCAVATION	CY	73,300
69	190107	ROADWAY EXCAVATION (TYPE Y-1) (AERIALY DEPOSITED LEAD)	CY	1,760
70 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	2,965
71 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	CY	4,195
72 (F)	192048	STRUCTURE EXCAVATION, RETAINING WALL (SOUND WALL)	CY	146
73 (F)	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	CY	1,591
74 (F)	192060	STRUCTURE EXCAVATION (GROUND ANCHOR WALL)	CY	222
75 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	2,502
76 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	3,917
77 (F)	193020	STRUCTURE BACKFILL, RETAINING WALL (SOUND WALL)	CY	111
78 (F)	193027	STRUCTURE BACKFILL (GROUND ANCHOR WALL)	CY	9
79 (F)	193028	STRUCTURE BACKFILL (SOIL NAIL WALL)	CY	113
80 (F)	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	CY	380

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	194001	DITCH EXCAVATION	CY	200
82	200002	ROADSIDE CLEARING	LS	LUMP SUM
83	200052	PRUNE EXISTING PLANTS	LS	LUMP SUM
84	200114	ROCK BLANKET	SQYD	620
85	202004	IRON SULFATE (LB)	LB	2,220
86	202006	SOIL AMENDMENT	CY	330
87	202011	MULCH	CY	2,640
88	202035	FERTILIZER (PACKET)	EA	11,200
89	202037	ORGANIC FERTILIZER	LB	2,780
90	204009	PLANT (GROUP I)	EA	3,830
91	204022	PLANT (GROUP Z)	EA	45
92	204035	PLANT (GROUP A)	EA	2,390
93	204036	PLANT (GROUP B)	EA	2,270
94	204096	MAINTAIN EXISTING PLANTED AREAS	LS	LUMP SUM
95	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
96	206401	MAINTAIN EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
97	206560	CONTROL AND NEUTRAL CONDUCTORS	LS	LUMP SUM
98	206602	1" ELECTRIC REMOTE CONTROL VALVE	EA	19
99	206604	1 1/2" ELECTRIC REMOTE CONTROL VALVE	EA	48
100	206605	2" ELECTRIC REMOTE CONTROL VALVE	EA	2

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101	025703	1 1/2" ELECTRIC REMOTE CONTROL FLOW SENSOR	EA	1
102	025704	2" ELECTRIC REMOTE CONTROL VALVE (MASTER)	EA	1
103	025705	48-STATION IRRIGATION CONTROLLER ASSEMBLY (PEDESTAL MOUNTED)	EA	5
104	025706	IRRIGATION CONTROLLER FIELD ASSEMBLED COMPONENTS	LS	LUMP SUM
105	025707	CONTROLLER FUNCTION TESTING (2 STAGES)	LS	LUMP SUM
106	208304	WATER METER	EA	1
107	208421	BACKFLOW PREVENTER ASSEMBLY ENCLOSURE	EA	1
108	208426	2" BACKFLOW PREVENTER ASSEMBLY	EA	1
109	208439	BACKFLOW PREVENTER ASSEMBLY BLANKETS	EA	1
110	208465	SPRINKLER (TYPE A-5)	EA	270
111	208466	SPRINKLER (TYPE A-6)	EA	90
112	208475	SPRINKLER (TYPE B-5)	EA	53
113	208476	SPRINKLER (TYPE B-6)	EA	12
114	208482	SPRINKLER (TYPE C-2)	EA	380
115	208588	3" GATE VALVE	EA	7
116 (F)	208595	1" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	10,980
117 (F)	208596	1 1/4" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	8,180
118 (F)	208597	1 1/2" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	3,510
119 (F)	208598	2" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	2,490
120 (F)	208599	2 1/2" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	5,190

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
121 (F)	025708	3" PLASTIC PIPE (PR 315) (SUPPLY LINE)	LF	6,110
122	208683	BALL VALVE	EA	11
123 (F)	208738	8" CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	LF	410
124	209202	RECYCLED WATER WARNING SIGNS	LS	LUMP SUM
125	025709	2" RECYCLED WATER CONNECTION ASSEMBLY	EA	1
126	210210	EROSION CONTROL (DRY SEED) (SQFT)	SQFT	43,900
127	210350	FIBER ROLLS	LF	1,100
128	210430	HYDROSEED	SQFT	20,500
129	240100	LIME	TON	1,100
130	240105	LIME STABILIZED SOIL	SQYD	50,300
131	250201	CLASS 2 AGGREGATE SUBBASE	CY	24,500
132	260203	CLASS 2 AGGREGATE BASE (CY)	CY	6,850
133	270003	CEMENT TREATED BASE (ROAD-MIXED, CLASS A) (CY)	CY	47
134	025710	BASE BOND BREAKER	SQYD	22,100
135	280000	LEAN CONCRETE BASE	CY	2,710
136	390131	HOT MIX ASPHALT	TON	30,400
137	390134	HOT MIX ASPHALT (OPEN GRADED)	TON	3,959
138	390137	RUBBERIZED HOT MIX ASPHALT (GAP GRADED)	TON	7,660
139	394074	PLACE HOT MIX ASPHALT DIKE (TYPE C)	LF	130
140	394076	PLACE HOT MIX ASPHALT DIKE (TYPE E)	LF	3,850

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
141	394077	PLACE HOT MIX ASPHALT DIKE (TYPE F)	LF	24
142	394090	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	SQYD	31
143	397005	TACK COAT	TON	53.3
144	401050	JOINTED PLAIN CONCRETE PAVEMENT	CY	6,990
145	404092	SEAL PAVEMENT JOINT	LF	41,300
146	460210	GROUND ANCHOR (SUBHORIZONTAL)	EA	95
147	460300	SOIL NAIL	LF	25,262
148	490603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	4,271
149	490616	84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	202
150	490736	FURNISH PILING (CLASS 90)	LF	16,803
151	490737	DRIVE PILE (CLASS 90)	EA	388
152	490780	FURNISH PILING (CLASS 200)	LF	1,360
153	490781	DRIVE PILE (CLASS 200)	EA	24
154	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	5,700
155	498022	24" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	91
156	498052	60" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	210
157	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
158 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	432
159 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	1,954
160 (F)	510059	STRUCTURE CONCRETE, RETAINING WALL (SOUND WALL)	CY	33

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
161 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	2,827
162 (F)	510061	STRUCTURAL CONCRETE, SOUND WALL	CY	58
163 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	136
164	510087	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)	CY	141
165 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	217
166 (F)	510526	MINOR CONCRETE (BACKFILL)	CY	131
167 (F)	044316	ARCHITECTURAL TREATMENT (BIRD)	SQFT	17,431
168 (F)	044317	ARCHITECTURAL TREATMENT (MISSION)	SQFT	14,200
169	511106	DRILL AND BOND DOWEL	LF	1,435
170	511110	DRILL AND BOND DOWEL (CHEMICAL ADHESIVE)	EA	188
171	519100	JOINT SEAL (MR 2")	LF	179
172 (F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	721,733
173 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	485,219
174 (F)	520120	HEADED BAR REINFORCEMENT	EA	1,162
175 (F)	530200	STRUCTURAL SHOTCRETE	CY	447
176	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	266,000
177	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	266,000
178	560244	FURNISH LAMINATED PANEL SIGN (1"-TYPE A)	SQFT	3,290
179	560245	FURNISH LAMINATED PANEL SIGN (1"-TYPE B)	SQFT	220
180	560248	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)	SQFT	780

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
181	560249	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)	SQFT	400
182	560251	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-FRAMED)	SQFT	94
183	560252	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-FRAMED)	SQFT	45
184	562004	METAL (RAIL MOUNTED SIGN)	LB	1,680
185	566011	ROADSIDE SIGN - ONE POST	EA	41
186	566012	ROADSIDE SIGN - TWO POST	EA	12
187	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	6
188	568016	INSTALL SIGN PANEL ON EXISTING FRAME	SQFT	48
189	568017	INSTALL ROADSIDE SIGN PANEL ON EXISTING POST	EA	2
190	568023	INSTALL ROADSIDE SIGN (LAMINATED WOOD BOX POST)	EA	3
191 (F)	582001	SOUND WALL (MASONRY BLOCK)	SQFT	25,781
192	597401	PAINT CURB (2-COAT)	SQFT	66
193	650014	18" REINFORCED CONCRETE PIPE	LF	140
194	650018	24" REINFORCED CONCRETE PIPE	LF	3,630
195	650026	36" REINFORCED CONCRETE PIPE	LF	75
196	665005	8" CORRUGATED STEEL PIPE (.064" THICK)	LF	185
197	680902	6" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	6,410
198	681132	GEOCOMPOSITE DRAIN	SQFT	2,935
199	703217	18" CORRUGATED STEEL PIPE RISER (.079" THICK)	LF	32
200	703223	24" CORRUGATED STEEL PIPE RISER (.079" THICK)	LF	3

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
201	703254	48" CORRUGATED STEEL PIPE RISER (.079" THICK)	LF	3
202	705315	24" ALTERNATIVE FLARED END SECTION	EA	2
203	707117	36" PRECAST CONCRETE PIPE INLET	LF	47
204	707467	36" REINFORCED CONCRETE PIPE RISER	LF	36
205	721017	ROCK SLOPE PROTECTION (FACING, METHOD B) (CY)	CY	15
206 (F)	721019	ROCK SLOPE PROTECTION (NO. 3, METHOD B) (CY)	CY	3
207	721420	CONCRETE (DITCH LINING)	CY	160
208	721810	SLOPE PAVING (CONCRETE)	CY	548
209	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	40
210	730040	MINOR CONCRETE (GUTTER) (LF)	LF	1,315
211	730070	DETECTABLE WARNING SURFACE	SQFT	27
212	731504	MINOR CONCRETE (CURB AND GUTTER)	CY	49
213	731521	MINOR CONCRETE (SIDEWALK)	CY	6
214	731530	MINOR CONCRETE (TEXTURED PAVING)	CY	340
215	731623	MINOR CONCRETE (CURB RAMP)	CY	5
216 (F)	750001	MISCELLANEOUS IRON AND STEEL	LB	28,477
217	800100	TEMPORARY FENCE	LF	2,100
218	800360	CHAIN LINK FENCE (TYPE CL-6)	LF	30
219	802501	4' CHAIN LINK GATE (TYPE CL-6)	EA	1
220	820107	DELINEATOR (CLASS 1)	EA	130

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
221	820130	OBJECT MARKER	EA	1
222	832003	METAL BEAM GUARD RAILING (WOOD POST)	LF	1,030
223	832070	VEGETATION CONTROL (MINOR CONCRETE)	SQYD	500
224	025711	CONCRETE BARRIER (TYPE 60C MODIFIED 1)	LF	360
225	025712	CONCRETE BARRIER (TYPE 60C MODIFIED 2)	LF	68
226	025713	CONCRETE BARRIER (TYPE 60F MOD)	LF	1,580
227 (F)	839521	CABLE RAILING	LF	1,314
228	839541	TRANSITION RAILING (TYPE WB)	EA	7
229	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	3
230	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	7
231	839604	CRASH CUSHION (REACT 9CBB)	EA	1
232	839631	CRASH CUSHION MODULE, SAND FILLED	EA	14
233	839699	CONCRETE BARRIER (TYPE 60P)	LF	12
234	839701	CONCRETE BARRIER (TYPE 60)	LF	900
235	839703	CONCRETE BARRIER (TYPE 60C)	LF	1,490
236	044318	CONCRETE BARRIER (TYPE 60A MODIFIED)	LF	394
237	839706	CONCRETE BARRIER (TYPE 60G)	LF	320
238	839708	CONCRETE BARRIER (TYPE 60GC)	LF	1,720
239	839709	CONCRETE BARRIER (TYPE 60GE)	LF	75
240	025714	CONCRETE BARRIER (TYPE 60R)	LF	1,050

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
241 (F)	044319	CONCRETE BARRIER (TYPE 736A MODIFIED)	LF	985
242 (F)	839727	CONCRETE BARRIER (TYPE 736 MODIFIED)	LF	1,055
243 (F)	839731	CONCRETE BARRIER (TYPE 736B)	LF	245
244 (F)	044320	CONCRETE BARRIER (TYPE 736B MODIFIED)	LF	192
245 (F)	839734	CONCRETE BARRIER (TYPE 736SV)	LF	1,506
246	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	60,800
247	840505	6" THERMOPLASTIC TRAFFIC STRIPE	LF	48,400
248	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	7,630
249	840508	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	3,950
250	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	4,470
251	840525	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12)	LF	8,800
252	840526	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)	LF	1,620
253	840550	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12)	LF	20,200
254	840656	PAINT TRAFFIC STRIPE (2-COAT)	LF	33,700
255	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	4,030
256	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	3,870
257	860090	MAINTAINING EXISTING TRAFFIC MANAGEMENT SYSTEM ELEMENTS DURING CONSTRUCTION	LS	LUMP SUM
258	025715	LIGHTING AND SIGN ILLUMINATION (STAGE CONSTRUCTION)	LS	LUMP SUM
259	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
260	860797	ELECTRIC SERVICE (IRRIGATION)	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
261	025716	TEMPORARY TRAFFIC MONITORING STATION	LS	LUMP SUM
262	860889	MODIFY TRAFFIC MONITORING STATION	LS	LUMP SUM
263	025717	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 1)	LS	LUMP SUM
264	025718	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 2)	LS	LUMP SUM
265	025719	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 3)	LS	LUMP SUM
266	025720	MODIFY RAMP METERING SYSTEM (LOCATION 1)	LS	LUMP SUM
267	025721	MODIFY RAMP METERING SYSTEM (LOCATION 2)	LS	LUMP SUM
268	025722	MODIFY RAMP METERING SYSTEM (LOCATION 3)	LS	LUMP SUM
269	025723	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 1)	LS	LUMP SUM
270	025724	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 2)	LS	LUMP SUM
271	025725	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 3)	LS	LUMP SUM
272	861498	MODIFY SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM
273	025726	TEMPORARY COMMUNICATION SYSTEM	LS	LUMP SUM
274	025727	MODIFY COMMUNICATION SYSTEM	LS	LUMP SUM
275	869075	SYSTEM TESTING AND DOCUMENTATION	LS	LUMP SUM
276	999990	MOBILIZATION	LS	LUMP SUM

SPECIAL PROVISIONS

DIVISION I GENERAL PROVISIONS

1 GENERAL

Add to section 1-1.01:

Bid Items and Applicable Sections

Item code	Item description	Applicable section
025703	1 1/2" ELECTRIC REMOTE CONTROL FLOW SENSOR	20
025704	2" ELECTRIC REMOTE CONTROL VALVE (MASTER)	20
025705	48 STATION IRRIGATION CONTROLLER ASSEMBLY (PEDESTAL MOUNTED)	20
025706	IRRIGATION CONTROLLER FIELD ASSEMBLED COMPONENTS	20
025707	CONTROLLER FUNCTION TESTING (2 STAGES)	20
025708	3" PLASTIC PIPE (PR 315) (SUPPLY LINE)	20
025709	2" RECYCLED WATER CONNECTION ASSEMBLY	20
025710	BASE BOND BREAKER	27
044316	ARCHITECTURAL TREATMENT (BIRD)	51
044317	ARCHITECTURAL TREATMENT (MISSION)	51
025711	CONCRETE BARRIER (TYPE 60C MODIFIED 1)	83
025712	CONCRETE BARRIER (TYPE 60C MODIFIED 2)	83
025713	CONCRETE BARRIER (TYPE 60F MODIFIED)	83
044318	CONCRETE BARRIER (TYPE 60A MODIFIED)	83
025714	CONCRETE BARRIER (TYPE 60R)	83
044319	CONCRETE BARRIER (TYPE 736A MODIFIED)	83
044320	CONCRETE BARRIER (TYPE 736B MODIFIED)	83
025702	SIGNAL AND LIGHTING (STAGE CONSTRUCTION) (LOCATION 1)	86
025715	LIGHTING AND SIGN ILLUMINATION (STAGE CONSTRUCTION)	86
025716	TEMPORARY TRAFFIC MONITORING STATION	86
025717	CLOSED CIRCUIT TELEVISION SYSTEM (LOCATION 1)	86
025715	CLOSED CIRCUIT TELEVISION SYSTEM (LOCATION 2)	86
025719	CLOSED CIRCUIT TELEVISION SYSTEM (LOCATION 3)	86
025717	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 1)	86
025718	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 2)	86
025719	CLOSED CIRCUIT TELEVISION SYSTEM (STAGE CONSTRUCTION) (LOCATION 3)	86
025720	MODIFY RAMP METERING SYSTEM (LOCATION 1)	86
025721	MODIFY RAMP METERING SYSTEM (LOCATION 2)	86
025722	MODIFY RAMP METERING SYSTEM (LOCATION 3)	86
025723	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 1)	86
025724	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 2)	86
025725	RAMP METERING SYSTEM (STAGE CONSTRUCTION) (LOCATION 3)	86
025726	TEMPORARY COMMUNICATION SYSTEM	86
025727	MODIFY COMMUNICATION SYSTEM	86

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2 BIDDING

Replace section 2-1.03 with:

2-1.03 MANDATORY PREBID MEETING

The Department will conduct a mandatory prebid meeting for this contract. The purpose of the meeting is to provide small businesses the opportunity to meet and interact with prospective bidders and increase their participation in the performance of contracts.

Each bidder must attend the mandatory prebid meeting. The bidder's representative must be a company officer, project superintendent, or project estimator. For a joint venture, one of the parties must attend the mandatory prebid meeting. The Department does not accept a bid from a bidder who did not attend the meeting.

A sign-up sheet is used to identify each prospective bidder. Each bidder is required to include the name and title of the company representative attending the mandatory prebid meeting. The Department may hold a single prebid meeting for more than 1 contract. Sign the sign-up sheet for the contract you intend to bid on. If you are bidding on multiple contracts, sign each sign-up sheet for each contract you intend to bid on.

The successful bidder is required to report each small business hired to work on this Contract as a result of the mandatory prebid meeting.

Add to section 2-1.06B:

The Department makes the following supplemental project information available:

Supplemental Project Information

Means	Description
Included in the <i>Information Handout</i>	1. Aerially Deposited Lead Report 2. Lead Based Paint Inspection Report 3. Asbestos Assessment Report for Bridge Structures 4. Materials Report 5. Geotechnical Design Report 6. Final Foundation Reports for: a. 5/N5-N1 Connector Separation b. Route 5/1 Separation c. Camino Capistrano Undercrossing d. Retaining Wall No. 349 e. Retaining Wall No. 387 f. Sign Structures 7. United States Fish and Wildlife Service Section 7 Consultation
Available as specified in the <i>Standard Specifications</i>	1. Cross sections 2. Bridge as-built drawings
Included with the project plans	Log of test borings
Available for inspection at the District Office Telephone no.: (949) 724-2273	Right of Way Appraisal Maps

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5 CONTROL OF WORK

Add to section 5-1.09A:

The Department encourages the project team to exhaust the use of partnering in dispute resolution before engagement of an objective third party.

For certain disputes, a facilitated partnering session or facilitated dispute resolution session may be appropriate and effective in clarifying issues and resolving all or part of a dispute.

To afford the project team enough time to plan and hold the session, a maximum of 20 days may be added to the DRB referral time following the Engineer's response to a *Supplemental Potential Claim Record*.

To allow this additional referral time, the project team must document its agreement and intention in the dispute resolution plan of the partnering charter. The team may further document agreement of any associated criteria to be met for use of the additional referral time.

If the session is not held, the DRB referral time remains in effect as specified in section 5-1.43.

Add to section 5-1.20A:

During the progress of the work under this Contract, work under the following contracts may be in progress at or near the job site of this Contract:

Coincident or Adjacent Contracts

Contract no.	County–Route–Post Mile	City	Type of work
12-0F96C4	ORA-5-3.7/6.2	Dana Point	Highway Construction
12-0E3104	ORA-74-0.0/1.6	San Juan Capistrano	Highway Construction
12-0F96A4	ORA-3.0/3.7	San Clemente	Highway Construction

Add to section 5-1.36D:

The utilities shown in the following table will not be rearranged. The utilities may interfere with pile driving, drilling activities, or substructure construction. If you want any of them rearranged or temporarily deactivated, make arrangements with the utility owner.

Utilities Not Rearranged for Pile Driving, Drilling Activities, or Substructure Construction

Utility	Location
8" Vitrified Clay Pipe Sewer in Concrete Cradle, owned by South Coast Water District	Near the NB Route 5 off-ramp to Camino Las Ramblas approximately at "A" Line Station 344+37
21" Concrete Pipe Water in 36" Steel Casing, owned by South Coast Water District	Near the NB Route 5 off-ramp to Camino Las Ramblas approximately at "A" Line Station 349+37
24" Welded Steel Pipe Water in 42" Steel Casing, owned by South Coast Water District	Near the NB Route 5 off-ramp to Camino Las Ramblas approximately at "A" Line Station 349+69
Underground Telephone Line in 24" Concrete Casing, owned by American Telephone and Telegraph	Near the NB Route 5 off-ramps to Camino Las Ramblas and Pacific Coast Highway approximately at "A" Line Station 352+58
12" Clay Pipe Sewer in 22" Steel Casing, owned by City of San Juan Capistrano	Near the NB Route 5 on-ramp from Camino Las Ramblas and SB Route 5 off-ramp to Camino Las Ramblas approximately at "A" Line Station 371+81
8" High Density Polyethylene Sewer in 18" High Density Polyethylene Casing, owned by City of San Juan Capistrano	Near the NB Route 5 on-ramp from Camino Las Ramblas approximately at "A" Line Station 388+49

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6 CONTROL OF MATERIALS

Add to section 6-2.03:

The Department furnishes you with:

- Laminated wood box posts with metal caps for roadside signs
- Disks for survey monuments
- Loop detector sensor units
- Model 170, 2070 controller assembly, including controller unit, completely wired controller cabinet, and detector sensor units

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit at 693 South Tustin Street, Orange, CA 92666; Phone: (714) 288-4053. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

You must furnish replacement plants. The Department does not pay you for the replacement plants.

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7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Replace section 7-1.02K(6)(j)(iii) with:

7-1.02K(6)(j)(iii) Earth Material Containing Lead

Section 7-1.02K(6)(j)(iii) includes specifications for handling, removing, and disposing of earth material containing nonhazardous waste concentrations of lead.

Submit a lead compliance plan.

With the exception of northbound Station 348+00 to Station 353+00 ("A" Line), lead is present at nonhazardous waste concentrations at the locations shown below in the "Earth Material Management" table. The average lead concentrations are below 1,000 mg/kg total lead and below 5 mg/L soluble lead. The material on the job site:

1. Is not a hazardous waste
2. Does not require disposal at a permitted landfill or solid waste disposal facility

Handle earth material containing hazardous waste concentrations of lead under section 14-11.03.

Lead has been detected in material to a depth of 4 feet in unpaved areas of the highway. Levels of lead found on the job site range from less than 1.6 to 922.0 mg/kg total lead with an average concentration of 41.5 mg/kg total lead as analyzed by EPA test method 6010 or EPA test method 7000 series and based upon a 95 percent upper confidence limit. Levels of lead found within the project limits have a predicted average soluble concentration of 2.05 mg/L as analyzed by the California Waste Extraction Test and based upon a 95 percent upper confidence limit.

Handle the material under all applicable laws, rules, and regulations, including those of the following agencies:

1. Cal/OSHA
2. CA RWQCB, Region 9—San Diego
3. CA Department of Toxic Substances Control

Manage the material as shown in the following table.

Earth Material Management

Location	Depth	Management requirements
Along NB Sta 340+00 to NB Sta 348+00 "A" Line	As shown on plan	Stockpile all excavated earth material at an authorized location before disposal or re-use on the project site
Along SB Sta 340+00 to SB Sta 353+00 "A" Line	As shown on plan	Stockpile all excavated earth material at an authorized location before disposal or re-use on the project site
From Sta 353+00 to Sta 408+00 "A" Line	As shown on plan	Stockpile all excavated earth material at an authorized location before disposal or re-use on the project site

If the material is disposed of:

1. Disclose the lead concentration of the material to the receiving property owner when obtaining authorization for disposal on the property
2. Obtain the receiving property owner's acknowledgment of lead concentration disclosure in the written authorization for disposal
3. You are responsible for any additional sampling and analysis required by the receiving property owner

If you choose to dispose of the material at a commercial landfill:

1. Transport it to a Class III or Class II landfill appropriately permitted to receive the material
2. You are responsible for identifying the appropriately permitted landfill to receive the material and for all associated trucking and disposal costs, including any additional sampling and analysis required by the receiving landfill

AA

8 PROSECUTION AND PROGRESS

Replace "Reserved" in section 8-1.04C with:

Section 8-1.04B does not apply.

Start job site activities within 55 days after receiving notice that the Contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department.

Do not start job site activities until the Department authorizes or accepts your submittal for:

1. CPM baseline schedule
2. WPCP or SWPPP, whichever applies
3. Notification of DRA or DRB nominee and disclosure statement

You may enter the job site only to measure controlling field dimensions and locating utilities.

Do not start other job site activities until all the submittals from the above list are authorized or accepted and the following information is received by the Engineer:

1. *Notice of Materials To Be Used.*
2. Contingency plan for reopening closures to public traffic.
3. Written statement from the vendor that the order for the sign panels has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
4. Written statement from the vendor that the order for electrical material has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.

You may start job site activities before the 55th day after Contract approval if you:

1. Obtain specified authorization or acceptance for each submittal before the 55th day
2. Receive authorization to start

Submit a notice 72 hours before starting job site activities. If the project has more than 1 location of work, submit a separate notice for each location.

AA

9 PAYMENT

Add to section 9-1.16C:

The following items are eligible for progress payment even if they are not incorporated into the work:

1. Control and Neutral Conductors
2. Electric Remote Control Valve Master
3. Electric Remote Control Valve
4. 48-Station Irrigation Controller
5. Plastic Pipe (PR 315) Supply Line
6. Backflow Preventer Assembly Enclosure
7. Backflow Preventer Assembly
8. Backflow Preventer Assembly Blankets
9. Sprinkler
10. Gate Valve
11. Plastic Pipe (Schedule 40) Supply Line
12. Ball Valve
13. Piling (except CIDH Piling)
14. Prestressing Steel for Cast-in-Place Concrete Members, Sealed Packages Only, and Prestressing Ducts and Anchorages
15. Joint Seal (Type B Joint Seals)
16. Bar Reinforcing Steel
17. Headed Bar Reinforcement
18. Furnish Sign Structure (Truss)
19. Reinforced Concrete Pipe
20. Corrugated Steel Pipe
21. Perforated Plastic Pipe Underdrain
22. Rock Slope Protection Fabric (Class 8)
23. Miscellaneous Iron and Steel
24. Manhole Frame and Grate
25. Miscellaneous Metal
26. Chain Link Fence (Type CL-6)
27. Chain Link Gate (Type CL-6)
28. Metal Beam Guard Railing (Wood Post)
29. Cable Railing
30. Transition Railing (Type WB)
31. Crash Cushion
32. Pavement Markers
33. Soil Nails
34. Ground Anchors
35. Pavement reinforcement, tie bars, tie bar baskets, dowel bars, and dowel bar baskets
36. Lighting Fixtures
37. Luminaires
38. Signal and Lighting Standards
39. Signal Heads and Mounting Brackets
40. Irrigation Controller Enclosure Cabinets
41. Camera Assemblies
42. Splice Vaults
43. Fiber Optic Cable
44. Innerduct

AA

DIVISION II GENERAL CONSTRUCTION

10 GENERAL

Add to section 10-1.02 of the RSS for section 10-1:

Do not place the uppermost layer of new pavement until all underlying conduits and loop detectors are installed.

Before starting the traffic signal functional test at any location, all items of work related to signal control must be completed and all roadside signs, pavement delineation, and pavement markings must be in place at that location.

Construction of the new structural section adjacent to the existing traveled way must be performed in successive and once all operations are under way concurrent operations of excavating, preparing subgrade, placing base materials, and paving. Excavation within 8 feet of the existing traveled way must not precede the paving operation by more than 5 working days unless:

1. Authorized
2. Material is placed and compacted against the vertical cuts within 8 feet of the existing traveled way. During excavation operations, native material may be used for this purpose except once the placing of the structural section starts, structural material must be used. Place the material up to the top of the existing pavement and taper at a slope of 4:1 (horizontal:vertical) or flatter to the bottom of the excavation. Do not use treated base for the taper.

At the end of each working day if a difference in excess of 0.5 feet exists between the elevation of the existing pavement and the elevation of an excavation within 8 feet of the traveled way, place and compact material against the vertical cut adjacent to the traveled way. During the excavation operation, you may use native material for this purpose except once the placing of the structural section starts, structural material must be used. Place the material up to the top of the existing pavement and taper at a slope of 4:1 (horizontal:vertical) or flatter to the bottom of the excavation. Do not use treated base for the taper.

AA

12 TEMPORARY TRAFFIC CONTROL

Replace section 12-2 with:

12-2 CONSTRUCTION PROJECT FUNDING SIGNS

12-2.01 GENERAL

Section 12-2 includes specifications for installing construction project funding signs.

Details for construction project funding signs are shown.

Keep construction project funding signs clean and in good repair at all times.

12-2.02 MATERIALS

Construction project funding signs must be wood post signs complying with section 56-4.

Sign panels for construction project funding signs must be framed, single sheet aluminum panels complying with section 56-2.

The background on construction project funding signs must be Type II retroreflective sheeting on the Authorized Material List for signing and delineation materials.

The legend must be retroreflective, except for nonreflective black letters and numerals. The colors blue and orange must comply with PR Color no. 3 and no. 6, respectively, as specified in the Federal Highway Administration's *Color Tolerance Chart*.

The legend for the type of project on construction project funding signs must read as follows:

HIGHWAY CONSTRUCTION

The legend for the types of funding on construction project funding signs must read as follows and in the following order:

FEDERAL HIGHWAY TRUST FUNDS

STATE HIGHWAY FUNDS

ORANGE COUNTY TRANSPORTATION FUNDS

The legend for the year of completion on construction project funding signs must read as follows:

YEAR OF COMPLETION 2016

The size of the legend on construction project funding signs must be as described. Do not add any additional information unless authorized.

12-2.03 CONSTRUCTION

Install 2 Type 2 construction project funding signs at the locations designated by the Engineer before starting major work activities visible to highway users.

When authorized, remove and dispose of construction project funding signs upon completion of the project.

12-2.04 PAYMENT

Not Used

Add to section 12-3.12C:

Start displaying the message on the portable changeable message sign 30 minutes before closing the lane.

Place the portable changeable message sign in advance of the 1st warning sign for each:

1. Stationary lane closure
2. Off-ramp closure
3. Connector closure
4. Shoulder closure
5. Speed reduction zone

For 5 days, starting on the day of signal activation, place 1 portable changeable message sign in each direction of travel and display the following message: "SIGNAL AHEAD -- PREPARE TO STOP."

Replace section 12-3.13 with:

12-3.13 IMPACT ATTENUATOR VEHICLE

12-3.13A General

12-3.13A(1) Summary

Section 12-3.13 includes specifications for protecting traffic and workers with an impact attenuator vehicle during moving lane closures and when placing and removing components of stationary lane closures, ramp closures, shoulder closures, or a combination.

Do not use an impact attenuator vehicle to place, remove, or place and remove components of a stationary traffic control system on freeway and ramps where the useable shoulder width is less than 10 feet.

Impact attenuator vehicles must comply with the following test levels under National Cooperative Highway Research Program 350:

1. Test level 3 if the preconstruction posted speed limit is 50 mph or more
2. Test levels 2 or 3 if the preconstruction posted speed limit is 45 mph or less

Comply with the attenuator manufacturer's instructions for:

1. Support truck
2. Trailer-mounted operation
3. Truck-mounted operation

Flashing arrow signs must comply with section 12-3.03. You may use a portable changeable message sign instead of a flashing arrow sign. If a portable changeable message sign is used as a flashing arrow sign, it must comply with section 6F.56 "Arrow Panels" of the *California MUTCD*.

12-3.13A(2) Definitions

impact attenuator vehicle: A support truck that is towing a deployed attenuator mounted to a trailer or a support truck with a deployed attenuator that is mounted to the support truck.

12-3.13A(3) Submittals

Upon request, submit a certificate of compliance for each attenuator used on the project.

12-3.13A(4) Quality Control and Assurance

Do not start impact attenuator vehicle activities until authorized.

Before starting impact attenuator vehicle activities, conduct a preinstallation meeting with the Engineer, subcontractors, and other parties involved with traffic control to discuss the operation of the impact attenuator vehicle during moving lane closures and when placing and removing components of stationary traffic control systems.

Schedule the location, time, and date for the preinstallation meeting with all participants. Furnish the facility for the preinstallation meeting within 5 miles of the job site or at another location if authorized.

12-3.13B Materials

Attenuators must be a brand on the Authorized Material List for highway safety features.

The combined weight of the support truck and the attenuator must be at least 19,800 pounds, except the weight of the support truck must not be less than 16,100 or greater than 26,400 pounds.

For the Trinity MPS-350 truck-mounted attenuator, the support truck must not have a fuel tank mounted underneath within 10'-6" of the rear of the support truck.

Each impact attenuator vehicle must have:

1. Legal brake lights, taillights, sidelights, and turn signals
2. Inverted "V" chevron pattern placed across the entire rear of the attenuator composed of alternating 4-inch wide nonreflective black stripes and 4-inch wide yellow retroreflective stripes sloping at 45 degrees
3. Type II flashing arrow sign
4. Flashing or rotating amber light
5. Operable 2-way communication system for maintaining contact with workers

12-3.13C Construction

Except where prohibited, use an impact attenuator vehicle:

1. To follow behind equipment and workers who are placing and removing components of a stationary lane closure, ramp closure, shoulder closure, or any combination. Operate the flashing arrow sign in the arrow or caution mode during this activity, whichever applies. Follow at a distance that prevents intrusion into the workspace from passing traffic.
2. As a shadow vehicle in a moving lane closure.

After placing components of a stationary traffic control system you may place the impact attenuator vehicle in advance of the work area or at another authorized location to protect traffic and workers.

Secure objects, including equipment, tools, and ballast on impact attenuator vehicles to prevent loosening upon impact by an errant vehicle.

Do not use a damaged attenuator in the work. Replace any attenuator damaged from an impact during work activities at your expense.

12-3.13 Payment

Not Used

Replace section 12-3.14 with:

12-3.14 TEMPORARY TRAFFIC SCREEN

12-3.14A General

Section 12-3.14 includes specifications for constructing temporary traffic screen at the locations shown.

12-3.14B Materials

Temporary traffic screen panels must be new or used, CDX grade or better, plywood or weather-resistant strandboard mounted and anchored on Type K temporary railing.

Wale boards must be new or used Douglas fir, rough sawn, construction grade or better.

Pipe screen supports must be new or used schedule 40, galvanized steel pipe.

Nuts, bolts, and washers must be cadmium plated.

Screws must be black or cadmium-plated flat head, cross-slotted screws with full thread length.

12-3.14C Construction

Mount and anchor temporary traffic screen on top of Type K temporary railing.

Remove the traffic screen from the highway when the Engineer determines it is no longer required. The traffic screen that is removed becomes your property.

A lateral move of Type K temporary railing with attached temporary traffic screen is change order work if ordered and the repositioning is not shown.

12-3.14D Payment

Temporary traffic screen is measured along the line of the completed screen.

Add to section 12-4.02A:

If work including installing, maintaining, and removing Type K temporary railing is to be performed within 6 feet of the adjacent traffic lane, close the adjacent traffic lane.

Except as listed above, closure of the adjacent traffic lane is not required for installing, maintaining, and removing traffic control devices.

For grinding and grooving operations, sawcutting concrete slabs, and installing loop detectors with an impact attenuator vehicle as a shadow vehicle, closure of the adjacent traffic lane is not required.

Designated holidays are as shown in the following table:

Designated Holidays	
Holiday	Date observed
New Year's Day	January 1st
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4th
Labor Day	1st Monday in September
Veterans Day	November 11th
Thanksgiving Day	4th Thursday in November
Christmas Day	December 25th

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

Special days are:

1. Festival of whales, every weekend in March
2. Doheny Blues Festival in May
3. Tall Ships Festival in September
4. Doheny Days Music Concert in September
5. Dana Point BBQ Championship in September
6. Orangeman Triathlon in September
7. Hurley Pro Surf Contest in September
8. Last two weeks of March
9. Thanksgiving week
10. Last two weeks of December

Not more than one stationary lane closures will be allowed in each direction of travel at one time.

Freeway closure charts are for the erection and removal of falsework, placement and removal of overhead sign structures, and other authorized work.

If work vehicles or equipment are parked within 6 feet of a traffic lane, close the shoulder area as shown.

At each location where falsework is constructed over a street or route listed, provide openings through the bridge falsework. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of the falsework lighting, if required for each opening, must comply with the requirements shown in the table. The width of vehicular openings is the clear width between temporary railings or other protective work. The spacing shown in the table for falsework pavement lighting is the maximum distance from center to center, in feet, between fixtures.

Design and construct special shallow falsework to meet the required minimum vehicle opening height shown in the tables below for Br. No. 55-0226, SB Route 5 widening and Br. No. 55-0510, SB Route 5 widening:

Camino Las Ramblas/Pacific Coast Highway
Route 5/Route 1 Separation
Bridge Number 55-0510

	Number	Width (feet)	Height (feet)
Vehicle openings			
Eastbound	2	26	15
Westbound	1	26	15
Pedestrian openings	None	--	--
	Location	Spacing	
Falsework pavement lighting	R & L	30 and staggered 1/2 space	

NOTE:

R = Right side of traffic

L = Left side of traffic

C = Centered overhead

Northbound Off-Ramp to Pacific Coast Highway
Route 5/N5-N1 Connector Separation
Bridge Number 55-0226

	Number	Width (feet)	Height (feet)
Vehicle openings			
	1	16	15
Pedestrian openings	None	--	--
	Location	Spacing	
Falsework pavement lighting	R	22.5	

NOTE:

R = Right side of traffic

L = Left side of traffic

C = Centered overhead

Camino Capistrano On-Ramp
Camino Capistrano Undercrossing
Bridge Number 55-0227

	Number	Width (feet)	Height (feet)
Vehicle openings	2	27	15
Pedestrian openings	None	--	--
	Location	Spacing	
Falsework pavement lighting	R & L	30 and staggered 1/2 space	

NOTE:

R = Right side of traffic

L = Left side of traffic

C = Centered overhead

The exact location of openings will be determined by the Engineer.

Delete the 1st through 5th paragraphs of the RSS for section 12-4.03.

Add to section 12-4.03:

For each 10-minute interval or fraction thereof past the time specified to reopen the closure, the Department deducts the amount for damages per interval shown below. Damages are limited to 5 percent of the total bid per occurrence. Damages are not assessed if the Engineer orders the closure to remain in place beyond the scheduled pickup time.

Type of facility	Route or segment	Period	Damages/interval (\$)
Mainline	Route 5 & Ramps	1st half hour 2nd half hour 2nd hour and beyond	\$5,000 / 10 minutes \$7,500 / 10 minutes \$10,000 / 10 minutes

Replace "Reserved" in section 12-4.04 with:

Lane Closure Restriction for Designated Holidays and Special Days										
Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	H xx	xx	xx							
	SD xx									
x	xx	H xx	xx							
		SD xx								
	x	xx	H xx	xx						
			SD xx							
	x	xx	xx	H xx	xxx					
	x	xx	xx	SD xx	xxx					
				x	H xx					
				x	SD xx					
					x	H xx				
						SD xx				
						x	H xx	xx	xx	xx
							SD xx			
Legend:										
	Refer to lane requirement charts									
x	The full width of the traveled way must be open for use by traffic after 5 am.									
xx	The full width of the traveled way must be open for use by traffic.									
xxx	The full width of the traveled way must be open for use by traffic until 11 pm.									
H	Designated holiday									
SD	Special day									

Replace "Reserved" in section 12-4.05B with:

Chart no. 1 Freeway Lane Requirements																													
County: Orange														Route/Direction: 5/NB and 5/SB														PM: 6.2/8.7	
Closure limits: Just south of Via California to San Juan Creek Road																													
From hour to hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Mondays through Thursdays	2	2	2	2	2																				2				
Fridays	2	2	2	2	2																				2				
Saturdays	2	2	2	2	2																				2				
Sundays	2	2	2	2	2																				2				

Legend:

2

 Provide at least 2 adjacent through freeway lanes open in direction of travel

 Work allowed within the highway where shoulder or lane closure is not required

REMARKS:

Replace "Reserved" in section 12-4.05C with:

Chart no. 2 Complete Freeway Closure Hours																													
County: Orange														Route/Direction: 5/NB														PM: 3.3/7.0	
Closure limits: From south of Avenida Pico to north of Camino Las Ramblas																													
From hour to hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Mondays through Thursdays	C	C	C	C																									
Fridays																													
Saturdays																													
Sundays																													

Legend:

C

 Freeway or expressway may be closed completely

 No complete freeway or expressway closure is allowed

REMARKS:

For Detour Plan No. 1 on Motorist Information Plan MI-3 (for removal and installation of overhead sign structure only).

Chart no. 3																													
Complete Freeway Closure Hours																													
County: Orange								Route/Direction: 5/SB								PM: 7.0/8.7													
Closure limits: From south of San Juan Creek Rd to north of Camino Las Ramblas																													
From hour to hour								24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24																					
Mondays through Thursdays								C	C	C	C																		
Fridays								C	C	C	C																		
Saturdays								C	C	C	C	C																	
Sundays								C	C	C	C	C																	
Legend: <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> Freeway or expressway may be closed completely </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> No complete freeway or expressway closure is allowed </div>																													
REMARKS: For Detour Plan No. 2 on Motorist Information Plan MI-4 (for removal and installation of overhead sign structure only).																													

Replace "Reserved" in section 12-4.05E with:

Chart no. 4																												
Complete Ramp Closure Hours																												
County: Orange								Route/Direction: 5/NB and 5/SB								PM: 6.4/7.5												
Closure limits: NB and SB PCH/Camino Las Ramblas Off-Ramps NB and SB PCH/Camino Las Ramblas On-Ramps NB Camino Capistrano On-Ramp																												
From hour to hour								24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24																				
Mondays through Thursdays								C	C	C	C	C																C
Fridays								C	C	C	C	C															C	
Saturdays								C	C	C	C	C	C														C	
Sundays								C	C	C	C	C	C														C	
Legend: <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> Ramp may be closed completely </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; width: 20px; height: 10px; display: inline-block; margin-right: 5px;"></div> Work allowed within the highway where shoulder or lane closure is not required </div>																												
REMARKS: For Detour Plan No. 5 on Motorist Information Plan MI-6. For Detour Plan No. 6 on Motorist Information Plan MI-6. For Detour Plan No. 9 on Motorist Information Plan MI-8. For Detour Plan No. 10 on Motorist Information Plan MI-9.																												

Chart no. 5																																					
Complete Ramp Closure Hours																																					
County: Orange														Route/Direction: 5/NB and 5/SB														PM: 6.4/6.8									
Closure limits: NB Camino Las Ramblas Off-Ramp SB Camino Las Ramblas Loop On-Ramp																																					
From hour to hour 24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24																																					
Mondays through Thursdays														C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
Fridays														C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Saturdays														C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Sundays														C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Legend: <div style="border: 1px solid black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></div> Ramp may be closed completely <div style="border: 1px solid black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></div> Work allowed within the highway where shoulder or lane closure is not required																																					
REMARKS: For Detour Plan No. 3 on Motorist Information Plan MI-5. For Detour Plan No. 4 on Motorist Information Plan MI-5. Maximum 9 consecutive days closure.																																					

Replace "Reserved" in section 12-4.05G with:

Chart no. 6																																					
Complete Conventional Highway Closure Hours																																					
County: Orange														Route/Direction: Camino Las Ramblas														PM: 6.2/8.7									
Closure limits: Station 20+00 to 30+00																																					
From hour to hour 24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24																																					
Mondays through Thursdays														C	C	C	C	C																		C	
Fridays														C	C	C	C	C																		C	
Saturdays														C	C	C	C	C	C																	C	
Sundays														C	C	C	C	C	C																	C	
Legend: <div style="border: 1px solid black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></div> Conventional highway may be closed completely <div style="border: 1px solid black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></div> No complete conventional highway closure is allowed																																					
REMARKS: For Detour Plan No. 7 on Motorist Information Plan MI-7. For Detour Plan No. 8 on Motorist Information Plan MI-7.																																					

Replace section 12-5 with:

12-5 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

12-5.01 GENERAL

Section 12-5 includes specifications for closing traffic lanes, ramps, or a combination, with stationary lane closures on multilane highways. The traffic control system for a lane closure or a ramp closure must comply with the details shown.

Traffic control system includes signs.

12-5.02 MATERIALS

Not Used

12-5.03 CONSTRUCTION

Each vehicle used to place, maintain, and remove components of a traffic control system on a multilane highway must be equipped with a Type II flashing arrow sign that must be in operation whenever the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components if operated within a stationary-type lane closure must display only the caution display mode. The sign must be controllable by the operator of the vehicle while the vehicle is in motion. If a flashing arrow sign is required for a lane closure, the flashing arrow sign must be operational before the lane closure is in place.

Whenever components of the traffic control system are displaced or cease to operate or function as specified from any cause, immediately repair the components to the original condition or replace the components and restore the components to the original location.

For a stationary lane closure, ramp closure, or a combination, made only for the work period, remove the components of the traffic control system from the traveled way and shoulder, except for portable delineators placed along open trenches or excavation adjacent to the traveled way at the end of each work period. You may store the components at selected central locations designated by the Engineer within the limits of the highway.

12-5.04 PAYMENT

Traffic control system for lane closure is paid for as traffic control system.

The requirements in section 4-1.05 for payment adjustment do not apply to traffic control system. Adjustments in compensation for traffic control system will be made for an increase or decrease in traffic control work if ordered and will be made on the basis of the cost of the necessary increased or decreased traffic control. The adjustment will be made on a force account basis for increased work and estimated on the same basis in the case of decreased work.

A traffic control system required by change order work is paid for as a part of the change order work.

Replace section 12-8 with:

12-8 TEMPORARY PAVEMENT DELINEATION

12-8.01 GENERAL

Section 12-8 includes specifications for placing, applying, maintaining, and removing temporary pavement delineation.

Temporary signing for no-passing zones must comply with section 12-3.06.

Temporary painted traffic stripes and painted pavement markings used for temporary delineation must comply with section 84-3.

12-8.02 MATERIALS

12-8.02A General

Not Used

12-8.02B Temporary Lane Line and Centerline Delineation

Temporary pavement markers must be the same color as the lane line or centerline markers being replaced. Temporary pavement markers must be temporary pavement markers on the Authorized Material List for short-term day/night use, 14 days or less, or long-term day/night use, 180 days or less. Place temporary pavement markers under the manufacturer's instructions.

12-8.02C Temporary Edge Line Delineation

On multilane roadways, freeways, and expressways open to traffic where edge lines are obliterated and temporary pavement delineation to replace those edge lines is not shown, provide temporary pavement delineation for:

1. Right edge lines consisting of (1) a solid 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, or (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet
2. Left edge lines consisting of (1) solid 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet, or (4) temporary pavement markers placed longitudinally at intervals not exceeding 6 feet

12- 8.02H Temporary Pavement Markers

Temporary pavement markers must be one of the temporary pavement markers on the Authorized Material List for long term day/night use, 180 days or less.

12-8.03 CONSTRUCTION

12-8.03A General

Wherever work activities obliterate pavement delineation, place temporary or permanent pavement delineation before opening the traveled way to traffic. Place lane line and centerline pavement delineation for traveled ways open to traffic. On multilane roadways, freeways and expressways, place edge line delineation for traveled ways open to traffic.

Establish the alignment for the temporary pavement delineation including required lines or markers. Surfaces to receive an application of paint or removable traffic tape must be dry and free of dirt and loose material. Do not apply temporary pavement delineation over existing pavement delineation or other temporary pavement delineation. Maintain temporary pavement delineation, including replacement of required lines, markings, or markers every 180 days, until it is superseded or you replace it with a new pattern of temporary pavement delineation or permanent pavement delineation.

When the Engineer determines the temporary pavement delineation is no longer required for the direction of traffic, remove the temporary pavement markers, underlying adhesive, and removable traffic tape from the final layer of surfacing and from the existing pavement to remain in place. Remove temporary pavement delineation that conflicts with any subsequent or new traffic pattern for the area.

12-8.03B Temporary Lane line and Centerline Delineation

Whenever lane lines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown, the minimum lane line and centerline delineation must consist of temporary pavement markers placed longitudinally at intervals not exceeding 24 feet. For temporary pavement markers on the Authorized Material List for long-term day/night use, 180 days or less, cement the markers to the surfacing with the adhesive recommended by the manufacturer except do not use epoxy adhesive to place the pavement markers in areas where removal of the markers will be required.

For temporary lane line or centerline delineation consisting entirely of temporary pavement markers on the Authorized Material List for short-term day/night use, 14 days or less, place the markers longitudinally at intervals not exceeding 24 feet. Do not use the markers for more than 14 days on lanes opened to traffic. Place the permanent pavement delineation before the end of the 14 days. If the permanent pavement delineation is not placed within the 14 days, replace the temporary pavement markers with additional temporary pavement delineation equivalent to the pattern specified or shown for the permanent pavement delineation for the area. The Department does not pay for the additional temporary pavement delineation.

12-8.03C Temporary Edge Line Delineation

You may apply temporary painted traffic stripe where removal of a 4-inch wide traffic stripe is not required.

The Engineer determines the lateral offset for traffic cones, portable delineators, and channelizers used for temporary edge line delineation. If traffic cones or portable delineators are used for temporary pavement delineation for edge lines, maintain the cones or delineators during hours of the day when the cones or delineators are being used for temporary edge line delineation.

Channelizers used for temporary edge line delineation must be an orange surface-mounted type. Cement channelizer bases to the pavement under section 85 for cementing pavement markers to pavement except do not use epoxy adhesive to place channelizers on the top layer of the pavement. Channelizers must be one of the 36-inch, surface-mounted types on the Authorized Material List.

Remove the temporary edge line delineation when the Engineer determines it is no longer required for the direction of traffic.

12-8.03E Temporary Traffic Stripe Paint

Apply 1 or 2 coats of temporary traffic stripe paint for new or existing pavement.

The painted temporary traffic stripe must be complete in place at the location shown before opening the traveled way to traffic. Removal of painted temporary traffic stripe is not required.

12-8.03G Temporary Pavement Marking Paint

Apply and maintain temporary pavement markings consisting of painted pavement markings at the locations shown. The painted temporary pavement marking must be complete in place at the location shown before opening the traveled way to traffic. Removal of painted temporary pavement marking is not required.

Apply 1 or 2 coats of temporary pavement marking paint for new or existing pavement.

12- 8.03H Temporary Pavement Markers

Place temporary pavement markers under the manufacturer's instructions. Cement the markers to the surfacing with the manufacturer's recommended adhesive, except do not use epoxy adhesive in areas where removal of the pavement markers is required.

You may use retroreflective pavement markers specified in section 85 instead of temporary pavement markers for long term day/night use, 180 days or less, except to simulate patterns of broken traffic stripe. Retroreflective pavement markers used for temporary pavement markers must comply with section 85, except the waiting period before placing pavement markers on new HMA surfacing as specified in section 85-1.03 does not apply. Do not use epoxy adhesive to place pavement markers in areas where removal of the pavement markers is required.

Temporary pavement markers must be complete in place before opening the traveled way to traffic.

12-8.04 PAYMENT

Not Used

AA

13 WATER POLLUTION CONTROL

Add to section 13-1.01A:

San Diego RWQCB will review the authorized SWPPP.

Add to section 13-3.01A:

The project is risk level 2.

Comply with the permit issued by the San Diego RWQCB for *National Pollutant Discharge Elimination System (NPDES) Permit General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters Within the San Diego Region Except for San Diego Bay, Permit No. CAG919002*." The San Diego RWQCB permit governs stormwater and nonstormwater discharges resulting from construction activities in the project area. The San Diego RWQCB permit may be viewed at 9174 Sky Park Court, Suite 100, San Diego, CA 92123-4353.

Replace 1st paragraph of section 13-6.03C with:

Provide temporary drainage inlet protection around drainage inlets as changing conditions require. Drainage inlet protection must be Type 3A or Type 3B, as appropriate for conditions around the drainage inlet.

AA

14 ENVIRONMENTAL STEWARDSHIP

Add to section 14-1.02A:

An ESA exists on this project.

Before start of work, protect the ESA by installing temporary fence (type ESA).

Replace section 14-6.02 with:

14-6.02 SPECIES PROTECTION

14-6.02A General

Section 14-6.02 includes specifications for protecting regulated species or their habitat.

This project is within or near habitat for regulated species shown in the following table:

Species Name
Coastal California Gnatcatcher (<i>Polioptila californica californica</i>)
Least Bell's Vireo (<i>Vireo bellii pusillus</i>)
Mexican Free-tailed Bat (<i>Tadarida brasiliensis</i>)
Big Brown Bat (<i>Eptesicus fuscus</i>)
Pallid Bat (<i>Antrozous pallidus</i>)
Yuma Myotis (<i>Myotis yumanensis</i>)
Western Small-Footed Myotis (<i>Myotis ciliolabrum</i>)
California Myotis (<i>Myotis californicus</i>)
Western Mastiff Bat (<i>Eumops perotis</i>)
Silver-Haired Bat (<i>Lasionycteris noctivagans</i>)
Canyon Bat (<i>Parastrellus Hesperus</i>)
Townsend's Big-Eared Bat (<i>Corynorhinus townsendii</i>)
Migratory Birds

The Department anticipates nesting or attempted nesting by migratory and nongame birds from February 15 to August 31.

14-6.02B Material

Not Used

14-6.02C Construction

14-6.02C(1) General

Not Used

14-6.02C(2) Protective Radius

Upon discovery of a regulated species, stop construction activities within a 200-foot radius of the discovery. Immediately notify the Engineer. Do not resume activities until receiving notification from the Engineer.

14-6.02C(3) Protocols

Not Used

14-6.02C(4) Biological Resource Information

Not Used

14-6.02C(5) Protection Measures

At or near Structures (Species Protection Area 1), implement the following protection measures:

1. Bats anticipate to roost from March until August and hibernate from September to October.
2. A qualified biologist, representing the Department, will survey the project disturbance limits, 14 days prior to construction, to assess the potential for bat maternity roosting.
3. Work on structures shall be conducted during the day. If this is not feasible, direct lighting and noise away from night roosting areas.
4. Install temporary exclusion measures or devices, under supervision of the qualified biologist, 14 days prior to work on the structures. The temporary exclusion measures or devices must remain until the completion of construction.

5. If bats inhabit structures, stop construction activities within a 200-foot radius of the discovery. Immediately notify the Engineer. The Department investigates. Do not resume work within the specified radius of the discovery until authorized.

Within or near the Environmentally Sensitive Areas (Species Protection Area 2), implement the following protection measures:

1. A qualified biologist, representing the Department and approved by the US Fish and Wildlife Service, must be on site during initial clearing and grubbing, and weekly during construction within 200 feet of the habitats.
2. All employees, subcontractors, and representatives must receive a training and awareness program prior to construction. Submit a request for species protection awareness training 10 days before the start of work.
3. Construction equipment shall be equipped with properly operating and maintained mufflers to reduce construction noise during nesting season.
4. Pile driving is to occur outside of nesting season.
5. Clearing and grubbing is to occur outside of nesting season.
6. Project lighting shall be away from sensitive habitats during nighttime construction, and light glare shields shall be installed to reduce the extent of illumination into sensitive habitats.

Within the entire project area and outside of paved roads (Species Protection Area 3), implement the following protection measures:

1. In order to avoid impacts to nesting birds, any native or exotic vegetation removal, tree trimming activities, or bridge demolition will occur outside of the nesting season. In the event that vegetation clearing is necessary during the nesting season, a qualified biologist will conduct a preconstruction survey, 14 days prior to construction, to identify the locations of nests. Should nesting birds be found, an exclusionary buffer will be established by the qualified biologist. This buffer will be clearly marked in the field by construction personnel under the guidance of the qualified biologist, and construction or clearing will not be conducted in this zone until the qualified biologist determines that the young have fledged or the nest is no longer active.
2. To prevent project effects to bridge- and crevice-nesting birds (i.e., swifts and swallows), all work on existing bridges with potential habitat that is conducted between February 15 and October 31 will include the removal of all bird nests prior to construction under the guidance and observation of a qualified biologist. Removal will occur prior to February 1 of that year, before the swallow colony returns to the nesting site. Removal of swallow nests that are under construction must be repeated as frequently as necessary to prevent nest completion or until a nest exclusion device is installed (such as netting or a similar mechanism that keeps birds from building nests). Nest removal and exclusion device installation will be monitored by a qualified biologist. Such exclusion efforts must be continued to keep the structures free of swallows until September or the completion of construction. All nest exclusion techniques will be coordinated between the qualified biologist and the resource agencies.

14-6.02C(6) Monitoring Schedule

Monitor according to the following schedule:

Monitoring type	Schedule
Work within or near the Environmentally Sensitive Areas	Weekly during construction period

14-6.02D Payment

Not Used

Replace section 14-6.06 with:

14-6.06 SPECIES PROTECTION AREA

14-6.06A General

14-6.06A(1) Summary

Section 14-6.06 includes specifications for areas that have species protection requirements.

Species protection areas (SPAs) within the project limits are shown:

Species Protection Areas	
Identification	Location
Structures (SPA 1)	Route 5/1 Separation, 5/N5-N1 Connector Separation, Camino Capistrano UC along Pacific Coast Highway and Route 5
Environmentally Sensitive Area (SPA 2)	Along SB and NB Route 5 as shown on plans
SPA 3	Entire project area and outside of paved roads

14-6.06B Materials

Not Used

14-6.06C Construction

Not Used

14-6.06D Payment

Not Used

Replace section 14-7.03 with:

14-7.03 PALEONTOLOGICAL RESOURCES

14-7.03A General

14-7.03A(1) Summary

Section 14-7.03 includes specifications for coordinating and cooperating with Department provided paleontological resources monitoring.

The Department will perform paleontological monitoring and salvage during construction operations and related activities involving subsurface disturbance under California Public Resources Code Section 5097.5 and the California Environmental Quality Act (CEQA). The Department will provide a Paleontological Salvage Team consisting of a qualified Principal Paleontologist and Paleontological Monitors. The Engineer will make arrangements for the Paleontological Salvage Team to be at the job site.

All paleontological specimens within the highway are and remain the property of the Department once excavated.

14-7.03A(2) Submittals

Submit a schedule of subsurface disturbing activities at least 15 days before construction. Submit schedule updates at least 3 business days before implementing changes.

Submit a request for paleontological awareness training 10 days before the start of work.

14-7.03A(3) Quality Control and Assurance

Attend a pre-construction meeting with the Paleontological Salvage Team and the Engineer to establish procedures for cooperation and worker safety during monitoring and salvage activities.

All employees, subcontractors, and Contractor's representatives on the job site involved in subsurface disturbing activities must receive a one-hour paleontological resource awareness training program provided by the Paleontological Salvage Team before performing work at the job site.

14-7.03B Materials

Not Used

14-7.03C Construction

14-7.03C(1) General

Within the boundaries of the project area, no construction or related activities, which may involve subsurface disturbance, are permitted without authorization.

Notify the Engineer 15 days before start of subsurface disturbing activities.

The Paleontological Salvage Team will monitor and salvage appropriate fossil specimens identified during excavation. The Engineer may temporarily divert or stop construction operations in the vicinity of a paleontological find or notify you of the need to avoid disturbing an area pending removal of fossil specimens.

14-7.03D Payment

Any additional excavation required due to discovery of paleontological remains, required of you by the Paleontological Salvage Team is change order work.

Replace the 1st paragraph of section 14-8.02 with:

Do not operate construction equipment or run the equipment engines from 6:00 p.m. to 8:00 a.m. or on Sundays except you may operate equipment within the project limits during these hours to:

1. Service traffic control facilities
2. Service construction equipment

Add to section 14-8.02:

Add to section 14-9.02A

Notify the Air Pollution Control District (APCD) or Air Quality Management District (AQMD) identified below as required by the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR Part 61, Subpart M, and California Health and Safety Code section 39658(b)(1). Notification must take place no less than 14 days before starting demolition or renovation activities as defined in the NESHAP regulations. Notification forms and other information are available from:

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Forms and information may also be obtained from the air district's web site at: <http://www.aqmd.gov>.

Mail and fax original notification form with any necessary attachments to:

South Coast Air Quality Management District
Asbestos Notifications, File # 55641
Los Angeles, CA 90074-5641
Fax (909) 396-3342

Submit a copy of the notification form and attachments as an informational submittal before starting demolition or renovation activities.

Add to section 14-9.03A:

Comply with fugitive dust emission measures and procedures provided in South Coast Air Quality Management District (SCAQMD) Rule 403 that apply to work performed under the Contract.

Replace section 14-11.03 with:

14-11.03 MATERIAL CONTAINING HAZARDOUS WASTE CONCENTRATIONS OF AERIALLY DEPOSITED LEAD

14-11.03A General

14-11.03A(1) Summary

Section 14-11.03 includes specifications for hazardous waste management while excavating, stockpiling, transporting, placing, and disposing of material containing hazardous waste concentrations of aerially deposited lead (ADL). Handle material containing nonhazardous waste concentrations of lead under section 7-1.02K(j)(iii).

ADL is present within the project limits.

The Department has received from the DTSC a variance regarding the use of material containing ADL. The variance applies if Type Y-1 material is shown. The variance is available for inspection at the Department of Transportation, District 12, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-8894. Environmental Engineering Branch.

14-11.03A(2) Definitions

Type Y-1: Material that contains ADL in average concentrations (using the 90 percent Upper Confidence Limit) of 1.5 mg/L or less extractable lead (based on a modified waste extraction test using deionized water as the extractant) and 1,411 mg/kg or less total lead. This material is a California hazardous waste that may be reused as permitted under the variance of the DTSC provided that the lead contaminated soil is placed a minimum of 5 feet above the maximum historic water table elevation and covered with at least 1 foot of non-hazardous soil.

14-11.03A(3) Site Conditions

ADL concentration data and sample locations maps are included in the *Information Handout*.

Type Y-1 material exists between from the edges of existing pavement, from the northbound 348+00 to 353+00 stations, and from a depth of 0.0 to 4.0 feet below existing grade, as shown.

14-11.03A(4) Submittals

14-11.03A(4)(a) Lead Compliance Plan

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

Include perimeter air monitoring incorporating upwind and downwind locations as shown or as authorized. Monitor with personal air samplers using National Institute of Safety and Health Method 7082. Sampling must achieve a detection limit of $0.05 \mu\text{g}/\text{m}^3$ of air per day. Conduct daily monitoring while clearing and grubbing and performing earthwork operations. Analyze a single representative daily sample for lead. Analyze the sample and provide results to the Engineer within 24 hours. Analyses must be performed by a laboratory accredited by the Environmental Lead Laboratory-Accreditation Program of the American Industrial Hygiene Association. Average lead concentrations must not exceed $1.5 \mu\text{g}/\text{m}^3$ of air per day and $0.15 \mu\text{g}/\text{m}^3$ per day on a rolling 90-day basis. Calculate average daily concentrations based on monitoring to date, and projection based on those monitoring trends for the next 90 days or to the end of work subject to the lead compliance plan if less than the specified averaging period. If concentrations exceed these levels stop work and modify the work to prevent release of lead. Monitor under the direction of a CIH. The air monitoring data must be reviewed by and signed by the CIH.

14-11.03A(4)(b) Excavation and Transportation Plan

Within 15 days after approval of the Contract, submit 3 copies of an excavation and transportation plan. Allow 15 days for review. If revisions are required, as determined by the Engineer, submit the revised plan within 7 days of receipt of the Engineer's comments. For the revision, allow 7 days for the review. Minor changes to or clarifications of the initial submittal may be made and attached as amendments to the excavation and transportation plan. In order to allow construction to proceed, the Engineer may conditionally approve the plan while minor revisions or amendments are being completed.

Prepare the written, project specific excavation and transportation plan establishing the procedures you will use to comply with requirements for excavating, stockpiling, transporting, and placing or disposing of material containing hazardous waste concentrations of ADL. The plan must comply with the regulations of the DTSC and Cal/OSHA and the requirements of the variance. The sampling and analysis portions of the excavation and transportation plan must meet the requirements for the design and development of the sampling plan, statistical analysis, and reporting of test results contained in US EPA, SW 846, "Test Methods for Evaluating Solid Waste," Volume II: Field Manual Physical/Chemical, Chapter Nine, Section 9.1. The plan must include the following elements:

1. Excavation schedule by location and date
2. Temporary locations of stockpiled material
3. Survey methods for Type Y-1 material burial locations
4. Dust control measures
5. Air monitoring. Include the following information:
 - 5.1. Location and type of equipment
 - 5.2. Sampling frequency
 - 5.3. Name and address of the accredited laboratory where the analysis was performed
6. Transportation equipment and routes
7. Method for preventing spills and tracking material onto public roads
8. Truck waiting and staging areas
9. Example of bill of lading to be carried by trucks transporting Type Y-1 or Y-2, material. The bill of lading must include:
 - 9.1. US Department of Transportation (US DOT) description including shipping name
 - 9.2. Hazard class
 - 9.3. Identification number
 - 9.4. Handling codes
 - 9.5. Quantity of material
 - 9.6. Volume of material
10. Spill Contingency Plan for material containing ADL

14-11.03A(4)(c) Burial Location Report

Within 5 business days of completing placement of Type Y-1 material at a burial location, submit a report for that burial location, including "Burial Location of Soil Containing Aerial Deposited Lead" form and electronic geospatial vector data shapefiles of the top and bottom perimeters of the burial location. Submit to the Engineer and to:

ADL@dot.ca.gov

The Engineer notifies you of acceptance or rejection of the burial location report within 5 business days of receipt. If the report is rejected, you have 5 business days to submit a corrected report.

14-11.03A(4)(d) Bill of Lading

Copies of the bills of lading must be submitted as an information handout upon placement of Type Y-1 material in its final location.

14-11.03A(5) Quality Control and Assurance

Excavation, reuse, and disposal of material with ADL must comply with rules and regulations of the following agencies:

1. US DOT
2. US EPA
3. California Environmental Protection Agency
4. CDPH
5. DTSC
6. Cal/OSHA
7. California Department of Resources Recycling and Recovery
8. RWQCB, Region 9, San Diego
9. State Air Resources Control Board
10. South Coast Air Quality Management District

Transport and dispose of material containing hazardous levels of lead under federal and state laws and regulations and county and municipal ordinances and regulations. Laws and regulations that govern this work include:

1. Health & Safety Code, Division 20, Chp 6.5 (California Hazardous Waste Control Act)
2. 22 CA Code of Regs, Div. 4.5 (Environmental Health Standards for the Management of Hazardous Waste)
3. 8 CA Code of Regs

14-11.03B Materials

Not Used

14-11.03C Construction**14-11.03C(1) General**

Not Used

14-11.03C(2) Material Management

Place Type Y-1 material as shown and cover with a minimum 1 foot layer of nonhazardous soil or the pavement structure. Temporary surplus material may be generated on this project due to the requirements of stage construction.

14-11.03C(3) Dust Control

Excavation, transportation, placement, and handling of material containing ADL must result in no visible dust migration. A water truck or tank must be on the job site at all times while clearing and grubbing and performing earthwork operations in work areas containing ADL. Apply water to prevent visible dust.

14-11.03C(4) Surveying Type Y-1 or Y-2 Material Burial Locations

Survey the location of the bottom and top perimeters of each area where you bury Type Y-1 material (burial locations). The survey must be performed by or under the direction of one of the following:

1. Land surveyor licensed under the Bus & Prof Code, Chp 15 (commencing with § 8700)
2. Civil engineer licensed prior to January 1, 1982 under the Bus & Prof Code, Chp 7 (commencing with § 6700)

Survey 10 points to determine each burial location horizontally and vertically within the specified accuracies and to create closed polygons of the perimeters of the bottom and top of the burial location. If 10 points are not sufficient to define the polygon, add additional points until the polygon is defined. Establish the position of the bottom and top perimeters before placing subsequent layers of material that obstruct the location.

Report each burial location in California State Plane Coordinates in US Survey feet within the appropriate zone of the California Coordinate System of 1983 (CCS83) and in latitude and longitude. Horizontal positions must be referenced to CCS83 (epoch 2007.00 or later National Geodetic Survey [NGS] or California Spatial Reference Center [CSRC] published epoch) to an accuracy of 3 ft horizontally. The elevation of points identifying the burial location must locate the bottom and top of Type Y-1 material to an accuracy of 1 ft vertically. Elevations of the bottom and top of Type Y-1 material must be referenced to North American Vertical Datum of 1988 (NAVD88). Report accuracy of spatial data in US Survey feet under Federal Geographic Data Committee (FGDC)-STD-007.1-1998.

14-11.03C(5) Material Transportation

Before traveling on public roads, remove loose and extraneous material from surfaces outside the cargo areas of the transporting vehicles and cover the cargo with tarpaulins or other cover, as outlined in the approved excavation and transportation plan. You are responsible for costs due to spillage of material containing lead during transport. Transportation routes for Type Y-1 or Y-2 material must only include the highway.

14-11.03C(6) Disposal

Not Used

14-11.03D Payment

Payment for a lead compliance plan is not included in the payment for environmental stewardship work.

The Department does not pay for stockpiling of material containing ADL, unless the stockpiling is ordered. The Department does not pay for sampling and analysis unless it is ordered. The Department does not pay for additional sampling and analysis required by the receiving landfill.

Replace section 14-11.07 with:

14-11.07 REMOVE YELLOW TRAFFIC STRIPE AND PAVEMENT MARKING WITH HAZARDOUS WASTE RESIDUE

14-11.07A General

14-11.07A(1) Summary

Section 14-11.07 includes specifications for removing existing yellow thermoplastic and yellow painted traffic stripe and pavement marking. The residue from the removal of this material is a Department-generated hazardous waste.

Residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate. The average lead concentration is at least 1,000 mg/kg total lead or 5 mg/l soluble lead. When applied to the roadway, the yellow thermoplastic and yellow painted traffic stripe and pavement marking contained as much as 2.6 percent lead. Residue produced from the removal of this yellow thermoplastic and yellow painted traffic stripe and pavement marking contains heavy metals in concentrations that exceed thresholds established by the Health & Safety Code and 22 CA Code of Regs. For bidding purposes, assume the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

Work associated with disposal of hazardous waste residue regulated under RCRA as determined by test results is change order work.

Yellow thermoplastic and yellow paint may produce toxic fumes when heated.

14-11.07A(2) Submittals

14-11.07A(2)(a) General

Reserved

14-11.07A(2)(b) Lead Compliance Plan

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

14-11.07A(2)(c) Work Plan

Submit a work plan for the removal, containment, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The work plan must include:

1. Objective of the operation
2. Removal equipment
3. Procedures for removal and collection of yellow thermoplastic and yellow painted traffic stripe and pavement marking residue, including dust
4. Type of hazardous waste storage containers
5. Container storage location and how it will be secured
6. Hazardous waste sampling protocol and QA/QC requirements and procedures
7. Qualifications of sampling personnel
8. Analytical lab that will perform the analyses
9. DTSC registration certificate and CA Highway Patrol (CHP) Biennial Inspection of Terminals (BIT) Program compliance documentation of the hazardous waste hauler that will transport the hazardous waste
10. Disposal site that will accept the hazardous waste residue

The Engineer will review the work plan within 5 business days of receipt.

Do not perform work that generates hazardous waste residue until the work plan has been authorized.

Correct any rejected work plan and resubmit a corrected work plan within 5 business days of notification by the Engineer. A new review period of 5 business days will begin from date of resubmittal.

14-11.07A(2)(d) Analytical Test Results

Submit analytical test results of the residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking, including chain of custody documentation, for review and acceptance before:

1. Requesting the Engineer's signature on the waste profile requested by the disposal facility
2. Requesting the Engineer obtain an US EPA Generator Identification Number for disposal
3. Removing the residue from the site

14-11.07A(2)(e) U.S. Environmental Protection Agency Identification Number Request

Submit a request for the US EPA Generator Identification Number when the Engineer accepts analytical test results documenting that residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking is a hazardous waste.

14-11.07A(2)(f) Disposal Documentation

Submit documentation of proper disposal from the receiving landfill within 5 business days of residue transport from the project.

14-11.07B Materials

Not Used

14-11.07C Construction

Where grinding or other authorized methods are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking that will produce a hazardous waste residue, immediately contain and collect the removed residue, including dust. Use a HEPA filter-equipped vacuum attachment operated concurrently with the removal operations or other equally effective approved methods for collection of the residue.

Make necessary arrangements to test the yellow thermoplastic and yellow paint hazardous waste residue as required by the disposal facility and these special provisions. Testing must include:

1. Total lead by US EPA Method 6010B
2. Total chromium by US EPA Method 6010B
3. Soluble lead by California Waste Extraction Test (CA WET)
4. Soluble chromium by CA WET
5. Soluble lead by Toxicity Characteristic Leaching Procedure (TCLP)
6. Soluble chromium by TCLP

From the first 220 gal of hazardous waste or portion thereof if less than 220 gal of hazardous waste are produced, a minimum of 4 randomly selected samples must be taken and analyzed individually. Samples must not be composited. From each additional 880 gal of hazardous waste or portion thereof if less than 880 gal are produced, a minimum of 1 additional random sample must be taken and analyzed. Use chain of custody procedures consistent with chapter 9 of US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) while transporting samples from the project to the laboratory. Each sample must be homogenized before analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses must then be taken. This aliquot must be homogenized a 2nd time and the total and soluble analyses run on this aliquot. The homogenization process must not include grinding of the samples. Submit the name and location of the disposal facility that will be accepting the hazardous waste and the analytical laboratory along with the testing requirements not less than 5 business days before the start of removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory must be certified by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) for all analyses to be performed.

After the Engineer accepts the analytical test results, dispose of yellow thermoplastic and yellow paint hazardous waste residue at a Class 1 disposal facility located in California under the requirements of the disposal facility operator within 30 days after accumulating 220 pounds of residue and dust.

If less than 220 pounds of hazardous waste residue and dust is generated in total, dispose of it within 30 days after the start of accumulation of the residue and dust.

The Engineer will sign all manifests as the generator within 2 business days of receiving and accepting the analytical test results and receiving your request for the US EPA Generator Identification Number. Use a transporter with a current DTSC registration certificate and that is in compliance with the CHP BIT Program when transporting hazardous waste.

14-11.07D Payment

Payment for a lead compliance plan is not included in the payment for environmental stewardship work.

If analytical test results demonstrate that the residue is a non-hazardous waste and the Engineer agrees, dispose of the residue at an appropriately permitted CA Class II or CA Class III facility. The Department does not adjust payment for this disposal.

Replace section 14-11.09 with:

14-11.09 TREATED WOOD WASTE

14-11.09A General

14-11.09A(1) Summary

Section 14-11.09 includes specifications for handling, storing, transporting, and disposing of treated wood waste (TWW).

Wood removed from metal beam guard railing and roadside sign is TWW. Manage TWW under 22 CA Code of Regs, Div. 4.5, Chp. 34.

14-11.09A(2) Submittals

For disposal of TWW, submit as an informational submittal a copy of each completed shipping record and weight receipt within 5 business days.

14-11.09B Materials

Not Used

14-11.09C Construction

14-11.09C(1) General

14-11.09C(2) Training

Provide training to personnel who handle TWW or may come in contact with TWW. Training must include:

1. All applicable requirements of 8 CA Code of Regs
2. Procedures for identifying and segregating TWW
3. Safe handling practices
4. Requirements of 22 CA Code of Regs, Div. 4.5, Chp. 34
5. Proper disposal methods

Maintain records of personnel training for 3 years.

14-11.09C(3) Storage

Store TWW before disposal using the following methods:

1. Elevate on blocks above a foreseeable run-on elevation and protect from precipitation for no more than 90 days.
2. Place on a containment surface or pad protected from run-on and precipitation for no more than 180 days.
3. Place in water-resistant containers designed for shipping or solid waste collection for no more than 1 year.
4. Place in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C).

Prevent unauthorized access to TWW using a secured enclosure such as a locked chain link fenced area or a lockable shipping container located within the job site.

Resize and segregate TWW at a location where debris from the operation including sawdust and chips can be contained. Collect and manage the debris as TWW.

Provide water-resistant labels that comply with 22 CA Code of Regs, Div. 4.5, Chp. 34, §67386.5, to clearly mark and identify TWW and accumulation areas. Labels must include:

1. Caltrans, District number, Construction, Construction Contract number
2. District office address
3. Engineer's name, address, and telephone number
4. Contractor's contact name, address and telephone number
5. Date placed in storage

14-11.09C(4) Transporting and Disposal

Before transporting TWW, obtain an agreement from the receiving facility that the TWW will be accepted. Protect shipments of TWW from loss and exposure to precipitation. For projects with 10,000 pounds or more of TWW, request a US EPA Generator Identification Number from the Engineer at least 5 business days before the first shipment. Each shipment must be accompanied by a shipping record such as a bill of lading or invoice that includes:

1. Caltrans with district number
2. Construction Contract number
3. District office address
4. Engineer's name, address, and telephone number
5. Contractor's contact name and telephone number
6. Receiving facility name and address
7. Waste description: Treated Wood Waste with preservative type if known or unknown/mixture
8. Project location
9. Estimated quantity of shipment by weight or volume
10. Date of transport
11. Date of receipt by the receiving TWW facility
12. Weight of shipment as measured by the receiving TWW facility
13. For projects with 10,000 pounds or more of TWW include the USA EPA Generator Identification Number.

The shipping record must be at least a 4-part carbon or carbonless 8 1/2 by 11-inch form to allow retention of copies by the Engineer, transporter, and disposal facility.

Dispose of TWW at an approved TWW facility. A list of currently approved TWW facilities is available at:

<http://www.dtsc.ca.gov/HazardousWaste/upload/lanfillapr11pdated1.pdf>

Dispose of TWW within:

1. 90 days of generation if stored on blocks
2. 180 days of generation if stored on a containment surface or pad
3. 1 year of generation if stored in a water-resistant container, or within 90 days after the container is full, whichever is shorter
4. 1 year of generation if storing in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C)

14-11.09D Payment

Not Used

Replace section 14-11.10 with:

14-11.10 DISPOSAL OF ELECTRICAL EQUIPMENT REQUIRING SPECIAL HANDLING

Ballasts and transformers that contain polychlorinated biphenyl (PCB) are designated as extremely hazardous wastes. Disposal of fluorescent light ballasts that contain PCBs must comply with 22 CA Code of Regs §§ 67426.1 et seq.

Fluorescent tubes, bulbs, and lamps, and mercury lamps are designated as universal wastes. Universal waste is a type of hazardous waste. Disposal of universal wastes must comply with 22 CA Code Regs §§ 66261.9

These wastes are Department-generated hazardous wastes. Ballasts must be packaged and transported by a hauler with a current DTSC registration certificate and documentation of compliance with the CA Highway Patrol Biennial Inspection of Terminals Program to a DTSC permitted hazardous waste disposal facility. Transport fluorescent tubes, bulbs, and lamps, and mercury lamps to an appropriately permitted facility.

Replace section 14-11.11 with:

14-11.11 MANAGEMENT OF ASBESTOS CONTAINING MATERIALS

14-11.11A General

14-11.11A(1) Summary

Section 14-11.11 includes specifications for removal and disposal of asbestos-containing material (ACM). Friable ACM generated as part of this work is Department-generated hazardous waste under 14-11.02F.

14-11.11A(2) Definitions

asbestos: Includes chrysotile, amosite, crocidolite, tremolite, anthrophyllite, actinolite and any of these minerals that has been chemically treated and/or altered.

asbestos-containing material (ACM): Any building material, including asbestos cement pipe containing commercial asbestos in an amount greater than 1% by weight, area, or count.

certified asbestos consultant (CAC): An asbestos consultant certified by Cal/OSHA under 8 CA Code of Regs § 341.15 and 1529.

friable ACM: Any material containing more than 1 percent asbestos by area that hand pressure can crumble, pulverize or reduce to powder when dry".

non-friable ACM: Asbestos fibers are tightly bound into the matrix of the material and should not become an airborne hazard as long as the material remains intact and undamaged, and is not sawed, sanded, drilled or otherwise abraded during removal (Asbestos Hazard Emergency Response Act (AHERA)).

14-11.11A(3) Asbestos Survey Results

Asbestos was detected at Bridge No. 55-0226, Bridge No. 55-0227, and Bridge No. 55-0510 in the shim material found at the interface of the metal beam guardrail and the concrete bridge. Portions of the survey report are included in the "Information Handout." The complete report entitled "Asbestos Assessment Report for Bridge Structures" is available for inspection at the Department of Transportation, District 12, Environmental Engineering Branch, located at 3347 Michelson Drive, Suite 100, Irvine, CA 92612.

14-11.11A(4) Submittals

14-11.11A(4)a Asbestos Surveying Work Plan for Sampling

Not Used

14-11.11A(4)b Asbestos Sampling and Analysis Report

Not Used

14-11.11A(4)c Air Quality Management District (AQMD) or Air Pollution Control District (APCD) Notification of Demolition

Submit a copy of the NESHAP notification form and attachments, required under section 14-9.02, before submittal to the AQMD or APCD.

14-11.11A(4)d Asbestos Compliance Plan

Prepare an Asbestos Compliance Plan (ACP) to prevent or minimize exposure to asbestos. The ACP must be signed by a CIH before submission to the Engineer for review and authorization. Submit the ACP to the Engineer at least 15 business days before beginning work in areas containing or suspected to contain asbestos. The ACP must comply with section 7-1.01A, "Labor Code Requirements" of the Standard Specifications and contain as a minimum:

1. Identification of key personnel for the project
2. Scope of Work and equipment that will be used
3. Job hazard analysis for work assignments
4. Summary of risk assessment
5. Personal protective equipment
6. Delineation of work zones on-site
7. Decontamination procedures
8. General safe work practices

9. Security measures
10. Emergency response plans
11. Worker training

14-11.11A(4)e Removal Work Plan

Prepare a work plan for the removal, storage, transportation and disposal of ACM. Removal and management of ACM must be performed by a contractor registered under Labor Code § 6501.5 and certified under Bus & Prof Code § 7058.6

Asbestos removal procedures must include:

1. Installing asbestos warning signs at perimeters of abatement work areas
2. Wetting asbestos materials with sprayers
3. Containing large volumes of asbestos materials in disposal bins for temporary storage until removed from the site
4. Providing manifests for disposal upon completion for the Engineer to sign
5. Providing transporters registered to transport hazardous waste in the state of California under the Health and Safety Code Ch 6.5, Div 20 and 22 CA Code of Regs, Div 4.5
6. Disposing of asbestos materials at a disposal facility permitted by the California Environmental Protection Agency
7. Compliance with federal, state, and local requirements for asbestos work, transport, and disposal

14-11.11A(4)f Certification of Completion of Safety Training

Submit a certification of completion of safety training for all trained personnel before starting work in areas containing or suspected to contain asbestos.

14-11.11A(4)g Waste Shipment Records

Submit a copy of all waste shipment records within 35 days after shipment.

14-11.11A(5) Quality Control and Assurance

14-11.11A(5)a Qualifications

The person in charge of asbestos inspection and abatement planning must be a CAC.

The person in charge of asbestos removal must be registered under Labor Code § 6501.5 and certified under Bus & Prof Code § 7058.6.

14-11.11A(5)b Regulatory Requirements

Codes which govern removal and disposal of materials containing asbestos include:

1. CA Health and Safety Code, Division 20, Chapter 6.5, Hazardous Waste Control
2. 8 CA Code of Regs, General Industry Safety Order 5208 Asbestos
3. 8 CA Code of Reg, § 1529 and 341
4. 22 CA Code of Regs, Division 4.5
5. Cal/OSHA, Part 26 (amended), of 29 CFR
6. 40 CFR, Part 61, subpart M

14-11.11B Materials

Not Used

14-11.11C Construction

Notify Cal/OSHA of changes in work locations or conditions under 8 CA Code of Regs § 341.9.

Before starting work in areas containing or suspected to contain asbestos, provide safety training that meets the requirements of 8 CA Code of Regs § 1529 to personnel who have no prior training or are not current in their training status, including State personnel.

Provide training, personal protective equipment, and medical surveillance required by the Asbestos Compliance Plan to 1 State personnel.

14-11.11C(1) Asbestos Inspection (Removal of ACM from Bridge)

Not Used.

14-11.11C(2) Unanticipated Suspected ACM discovered During Demolition or Excavation

If unanticipated suspected ACM is discovered during demolition, the portion of the work that involves the unanticipated suspected ACM must be performed by or under the direction of CAC. Test the suspected ACM in compliance with USEPA "Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance."

Notify the APCD or the AQMD of changes to removal or demolition plans, including discovery of ACM during demolition, within 2 business days of the change.

14-11.11C(3) Removal Comply with 8 CA Code of Regs § 1529 and § 341. Remove friable ACM using the wetting method. Remove and handle all non-friable ACM to prevent breakage. The removal of ACM encased in concrete or other similar structural material is not required before demolition, but the ACM must be adequately wetted whenever exposed during demolition. Prevent visible emissions from all ACM removal activities.

Mark all regulated work areas with the following or equivalent warning:

**DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY**

14-11.11C(4) Packaging

Comply with 22 CA Code of Regs, Div 4.5, Chapter 12, Article 3 requirements for packaging and labeling removed ACM. Place removed ACM in approved containers (double ply, 0.06-inch minimum thickness, plastic bags) with caution labels affixed to bags. Caution labels must have conspicuous, legible lettering, that spells out the following or equivalent warning:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

Place removed materials containing asbestos directly into a covered, lockable roll off or drop box that has the same caution label affixed on all sides.

14-11.11C(5) Transportation

All haulers of friable ACM must have current registration with DTSC for transporting hazardous waste and must have a U.S. Environmental Protection Agency Identification Number (U.S. EPA I.D. Number). All vehicles used to transport hazardous waste material must carry a valid registration during transport. Transport non-friable (non-hazardous waste) ACM to the disposal facility with a shipping document or waste shipment record.

14-11.11C(6) Disposal

Dispose of friable and non-friable waste containing asbestos at a disposal facility permitted to accept the waste and that meets all the requirements specified by federal, state and local regulations. Notify the proper authorities at the disposal site in advance of delivery of ACM.

14-11.11D Payment

Not Used

15 EXISTING FACILITIES

Replace section 15-2.02C(2) with:

15-2.02C(2) Remove Traffic Stripes and Pavement Markings Containing Lead

Residue from removing traffic stripes and pavement markings contains lead from the paint or thermoplastic. The average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. This residue:

1. Is a nonhazardous waste
2. Does not contain heavy metals in concentrations that exceed thresholds established by the Health and Safety Code and 22 CA Code of Regs
3. Is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

Payment for a lead compliance plan is not included in the payment for existing facilities work.

Payment for handling, removal, and disposal of pavement residue that is a nonhazardous waste is included in the payment for the type of removal work involved.

Replace section 15-2.02F with:

15-2.02F Remove Asphalt Concrete Dikes

Before removing the dike, cut the outside edge of the asphalt concrete on a neat line and to a minimum depth of 0.17 foot.

Replace section 15-2.0I with:

15-2.02I Remove Sign Structures

Removing overhead sign structures includes removal of:

1. Frames, braces, supports, and brackets
2. Portions of foundations
3. Sign panels
4. Mounting hardware for light fixtures
5. Walkways, safety railing, gutter
6. Electrical equipment for sign lighting
7. Hardware
8. Posts
9. Portions of foundations

Concrete foundations may be abandoned in place except that the top portion, including anchor bolts, reinforcing steel, and conduits, must be removed to a depth of not less than 5 feet below the adjacent finished grade. The resulting holes must be backfilled and compacted with material that is equivalent to the surrounding material.

Removing bridge mounted sign structures includes removal of:

1. Frames, braces, supports, and brackets
2. Portions of foundations
3. Sign panels
4. Mounting hardware for light fixtures
5. Walkways, safety railing, and gutter

6. Electrical equipment for sign lighting
7. Hardware

Remove signs' conduit and wiring to the nearest pull box. Remove fuses within spliced connections in the pull box.

Add the following to section 15-2.03A(1):

Salvage the following:

1. Frames and grates
2. Sign panels

Replace section 15-2.03A(2)(b) with:

15-2.03A(2)(b) Department Salvage Location

A minimum of 2 business days before hauling salvaged material to the Department salvage storage location, notify:

1. Engineer
2. District Regional Recycle coordinator at telephone number (714) 974-3091

The salvage storage location is:

Batavia Maintenance Yard
1808 North Batavia, Orange, CA 92865

Replace section 15-2.05C with:

15-2.05C Abandon Culverts and Pipelines

15-2.05C(1) General

Abandon culverts or pipelines by removing portions of the culverts or pipelines, filling the inside, and backfilling the depressions and trenches to grade. As an alternative to abandoning a culvert or pipeline, you may remove the culvert or pipeline, dispose of it, and backfill.

Notify the Engineer before abandoning a culvert or pipeline.

15-2.05C(2) Materials

Openings into existing structures that are to remain in place must be plugged with minor concrete under section 90.

15-2.05C(3) Construction

Wherever culverts or pipelines intersect side slopes, remove them to a depth of at least 3 feet. Measure the depth normal to the plane of the finished side slope. Abandon the remaining portion of the culvert or pipeline.

Culverts or pipelines that are 12 inches or more in diameter must be completely filled by authorized methods. Backfill with sand that is clean, free draining, and free from roots and other deleterious substances. As an alternative to sand, you may backfill with one of the following:

1. Controlled low-strength material under section 19-3.02F
2. Slurry cement backfill under section 19-3.02D

Ends of culverts and pipelines must be securely closed by a 6-inch-thick, tight-fitting plug or wall of commercial-quality concrete.

15-2.05C(4) Payment

If backfilling inside the culvert or pipeline is required, payment for backfilling inside the culvert or pipeline is paid for as sand backfill. Payment for backfilling outside the culvert or pipeline is included in the payment for abandon culvert or abandon pipeline.

15-2.05D Abandon Inlets

The top portion of the inlets must be removed to a depth of 5 feet below finished grade.

15-2.07B Modify Sign Structures

Bridge no.	Description of work
55-0226	See bridge plans for portions of bridge to be removed
55-0510	See bridge plans for portions of bridge to be removed
55-0227	See bridge plans for portions of bridge to be removed

[illegible]

AA

19 EARTHWORK

Replace the 2nd, 3rd, and 4th paragraphs of section 19-2.03B with:

Dispose of surplus material. Ensure enough material is available to complete the embankments before disposing of it.

Add to section 19-2.03G:

Roughen embankment slopes to receive erosion control materials by either track-walking or rolling with a sheepsfoot roller. Track-walk slopes by running track-mounted equipment perpendicular to slope contours.

Roughen excavation slopes and flat surfaces to receive erosion control materials by scarifying to a depth of 6 inches.

Add to section 19-3.01A(1):

Structure backfill includes constructing the geocomposite drain. Geocomposite drain must comply with section 68-7.

Add to section 19-3.01A(3)(b):

The wall zones for the soil nail wall at Retaining Wall No. 349 (Br. No. 55E0134) are shown in the following table:

Wall zone	Beginning station	End station	Top of wall elevation (ft)	Bottom of Wall elevation (ft)
1	349+99.69		204.80	197.99
		359+84.69	216.56	191.21
2	360+79.69		213.88	188.69
		363+14.69	186.49	178.14

The wall zones for the ground anchor wall at Retaining Wall No. 349 (Br. No. 55E0134) are shown in the following table:

Wall zone	Beginning station	End station	Upper elevation (ft)	Lower elevation (ft)
1	359+84.69		216.56	191.21
		360+79.69	213.88	188.69

Replace "Reserved" in section 19-3.03A with:

Where shown, remove material below the bottom of retaining wall footings at Br. No. 55-0226. Replace with structure backfill material and place and compact as specified for structure backfill in section 19-3.03E. Relative compaction must be at least 95 percent.

Add to section 19-3.03B(1):

Temporary shoring at retaining wall No. 387 (Br. No. 55E0135) as shown will be required to protect the adjacent existing MSE wall during excavation and pile driving.

Replace item 3 in the list in the 9th paragraph of section 19-3.03K with:

3. Grout and shotcrete have cured for at least 72 hours or have attained a compressive strength of at least 3,200 psi.

Add to section 19-3.03K:

Maximum length of each vertical cut for soil nail or ground anchor installation at any given time must not exceed 100 feet long.

Add to section 19-3.04:

Backfill material placed below the bottom of retaining wall footings at Br. No. 55-0226 is paid for as structure backfill.

Add to section 19-6.03D:

Settlement periods and surcharges are required for bridge approach embankments as shown in the following table:

Bridge name or number	Abutment number	Bent number	Surcharge height (feet)	Settlement period (days)
55-0226	Abuts 1 & 4	N/A	0.0 ^a	5
55-0227	Abuts 1 & 5	N/A	0.0 ^a	5
55-0510	Abuts 1 & 3	N/A	0.0 ^a	5

^aAt this location, the surcharge embankment must be constructed by extending the grading plane (GP) in the "Elevation" view of the "Bridge Embankment Surcharge" detail of Standard Plan A62B horizontally to the centerline of abutment.

AA

20 LANDSCAPE

Add to section 20-1.02B:

Pesticides used to control weeds must be limited to the following materials:

Aminopyralid
Diquat
Dithiopyr
Clopyralid MEA
Fluazifop-P-Butyl
Flumioxazin
Glyphosate
Imazapyr
Isoxaben (preemergent)
Oryzalin (preemergent)
Oxyfluorfen (non-odor type)
Pendimethalin (preemergent)
Prodiamine (preemergent)
Sethoxydim

Add to section 20-1.02B:

A granular preemergent may be used when applied to areas that will be covered with mulch, excluding plant basins. Granular preemergent must be limited to the following material:

1. Oxadiazon

Add to section 20-1.03B:

Granular preemergent must be applied before the placement of mulch. The preemergent application and mulch placement must be completed in a single area within the same work day.

Add to section 20-1.03B:

Before the application of preemergents, ground cover plants must have been planted a minimum of 3 days and must have been thoroughly watered.

A minimum of 100 days must elapse between applications of preemergents.

Except for ground cover plants, preemergents must not be applied within 18 inches of plants or within wildflower seeding areas.

Replace the last paragraph in section 20-1.03D with:

Dispose of pruned materials or reduce to chips and spread within the job site. Spread chipped material at locations determined by the Engineer. Chipped material must not be substituted for mulch, nor must the chipped material be placed within areas to receive mulch.

Add to the list in the 1st paragraph of section 20-2.01B:

3. A work plan for maintain existing planted areas.

Add to section 20-2.03D:

After deficiencies are corrected, perform work to maintain existing planted areas in a neat and presentable condition and to promote healthy plant growth. Submit a work plan that includes weeding, weed control, fertilization, mowing and trimming of turf areas, watering, and controlling rodents and pests. The work plan must include the following requirements:

1. Weeds must be killed in existing planted areas as shown. Weeds in existing plant basins, including basin walls, must be killed by hand pulling.
2. Where pesticides are used to kill weeds, weeds must be killed before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs first.
3. Where weeds are to be killed by hand pulling, weeds must be hand pulled before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs 1st, except for tumbleweeds. Dispose of weeds the same day they are pulled.
4. Tumbleweeds must be killed by hand pulling before they reach the seed stage of growth or exceed 6 inches in length, whichever occurs 1st. Dispose of tumbleweeds the same day they are pulled.
5. Weeds killed in existing planted areas must extend beyond the outer limits of the existing planted areas to the adjacent edges of paving, fences, proposed plants and planting areas, and the clearing limits as described in section 20-7.03B.
6. Weeds must be killed within a 6 foot diameter area centered at each existing tree and shrub located outside of the existing planted areas.
7. Pesticides used for maintaining existing planted areas must comply with section 20-1.02B.
8. Water plants automatically if the new irrigation system for that area is operational.
9. Existing plant basins, if still required as determined by the Engineer, must be kept well-formed and free of silt. If the existing plant basins need repairs, and the basins contain mulch, replace the mulch after the repairs are done.

Replace section 20-2.03D with:

20-2.03D Maintain Existing Planted Areas

Maintain existing planted areas as ordered. Maintain existing planted areas is change order work.

Add to section 20-2.04:

Prune existing plants to be maintained as ordered. Pruning existing plants to be maintained is change order work.

Replace section 20-3.01C(3) with:

20-3.01C(3) Control and Neutral Conductors Schedule of Values

Submit a schedule of values for control and neutral conductors. Submit the schedule after the wiring plans and diagrams for the electrical components of the irrigation system, except electrical service, have been authorized.

The unit descriptions shown in the table are the minimum. You may include additional unit descriptions. Include the quantity, value, and amount for those additional unit descriptions.

Use the authorized wiring plan and diagrams to determine the quantities required to complete the work.

No adjustment in compensation is made in the contract lump sum price paid for control and neutral conductors work due to differences between the quantities shown in the schedule of values for control and neutral conductors work and the quantities required to complete the work.

Schedule of Values for Control and Neutral Conductors

Contract no. _____				
Unit description	Unit	Approximate quantity	Value	Amount
___ AWG (UF) conductors (provide size)	LF			
___ AWG (UF) conductors	LF			
___ AWG (UF) conductors	LF			
___ AWG armor-clad conductors	LF			
___ AWG armor-clad conductors	LF			
___ AWG armor-clad conductors	LF			
No. 5 or larger pull box	EA			
Splices	EA			
___ Sprinkler control conduit (provide size)	LF			
___ Sprinkler control conduit	LF			
___ Sprinkler control conduit	LF			

Total _____

Replace section 20-3.02B(4) with:

20-3.02B(4) Backflow Preventer Assembly Enclosure

Fabricate enclosure of stainless steel angles and flattened expanded metal to comply with the following requirements:

1. Expanded metal sides, ends and top panels must be fabricated from 9-gauge minimum thickness stainless sheet steel. The flattened expanded metal openings must be approximately 3/4 by 1-3/4 inch in size.
2. Expanded metal panels must be attached to the 3/16-inch thick steel frames by a series of welds that are not less than 1/4 inch in length and spaced not more than 4 inches on center, along the edges of the enclosure.
3. Lock guards must be Type 304 stainless steel with a minimum thickness of 12 gauge.
4. Nuts must be hexagonal and washers must be lock type.
5. Powder coat by the manufacturer to match color no. 20450 of FED-STD-595.

The padlock is furnished by the Engineer.

Add to section 20-3.02O:

Before the irrigation system functional test begins, furnish 1 complete remote control valve actuator systems, except for receiver connectors, to the Engineer.

Replace the 4th paragraph of section 20-3.02P(2) with:

Pea gravel for filling the drainpipe must have a maximum diameter of 1/2 inch. Pea gravel must be naturally rounded aggregate, clean, washed, dry and free from clay or organic material.

Add to section 20-3.02R(1):

Ball valves must be 2-piece brass or bronze body.

Add to section 20-3.02R(3)(b):

Remote control valves must be, brass or bronze.

Add to section 20-3.02R(3)(b):

Valves must be angle pattern or straight pattern as shown.

Add to section 20-3.02(R)(7):

Pressure relief valves must be preset at the factory for relief at 100 psi.

Replace section 20-3.02V with:

20-3.02V Water Meters

Water meters for the irrigation systems are furnished and installed by the servicing utility at the locations shown.

Make the arrangements and pay the costs and fees required by the servicing utility.

The City of San Juan Capistrano has established a fee of \$6,000 for furnishing and installing a water meter. If, at the time of installation, this fee has changed, the Department takes a credit for the reduction in the fee, or the Department pays the difference for the increase in the fee. The credit or payment is taken or paid on the 1st monthly progress payment made after the meter is installed. Submit a copy of the invoice for the installation fee.

Make arrangements for furnishing and applying water until the water meters have been installed by the servicing utility.

Replace section 20-3.03C(1)(c) with:

20-3.03C(1)(c) Directional Boring

Notify the Engineer 2 working days before starting directional bore operations. Perform directional bore operations in the presence of the Engineer.

Conduits installed by the directional bore method must be PVC Schedule 40 and comply with section 20-3.02M(3)(a).

The diameter of the boring tool for directional boring must be only as large as necessary to install conduit. Only use mineral slurry or wetting solution to lubricate the boring tool and to stabilize the soil surrounding the boring path. Mineral slurry or wetting solution must be water based and environmentally safe.

Dispose of residue from directional boring operations.

The direction bore equipment must have directional control of the boring tool and an electronic boring tool location detection system. During operation the directional bore equipment must be able to determine the location of the tool both horizontally and vertically.

You must have direct charge and control of the directional bore operation at all times.

Add to section 20-3.03E(2):

Apply 1 application of a preemergent pesticide to trenched areas in existing ground cover areas and to trenched areas adjacent to fences, curbs, dikes and shoulders. The Engineer determines when the preemergent pesticide must be applied.

Replace the last paragraph in section 20-3.03E(2) with:

Dispose of removed ground cover and prunings or reduce to chips and spread within the job site. Spread chipped material at locations determined by the Engineer. Chipped material must not be substituted for mulch, nor must the chipped material be placed within areas to receive mulch.

Add to section 20-3.03F(1):

Pipe supply lines installed between water meters and backflow preventer assemblies must be installed not less than 2 feet below finished grade measured to the top of the pipe.

Add to section 20-3.03F(3):

Plastic pipe supply line mains must be installed not less than 2 feet below finished grade measured to the top of the pipe.

Replace section 20-3.03F(4) with:

20-3.03F(4) Plastic Pipe Irrigation Lines

Plastic pipe irrigation lines must be installed not less than 1 foot below finished grade measured to the top of the pipe.

Replace section 20-5 with:

20-5 REMOTE IRRIGATION CONTROL SYSTEM

20-5.01 GENERAL

20-5.01A Summary

Section 20-3 includes specifications for installing remote irrigation control system equipment.

20-5.01B Definitions

remote irrigation control system (RICS): A Remote Irrigation Control System is a water management system that consists of the following:

1. Web-based application
2. Field Controller
3. communicate via remote access

Web-based application: The ability to access a managing software that is coded in a browser-supported language and is executable via a common internet web browser (i.e. Microsoft Internet Explorer, Fire Fox, Safari, etc.).

satellite controller: An automatic irrigation controller that communicates directly to a web based server.

communication via remote access: Identifies the means by which satellite controllers can remotely communicate web-based server. Communication methods can be via cellular phone, internet connection, fiber optics network, (FCC compliant) radio signal, or other communication methods as described in the Electrical Non-Standard Special Provisions.

20-5.01C Submittals

20-5.01C(1) Product Data

Submit the manufacturer's descriptive and technical literature for all materials.

20-5.01C(2) Manufacturer's Instructions

Comply with section 20-3.01C(5) and add the following items:

1. All auxiliary items consisting of cables, antennas, and miscellaneous wiring.
2. Internet connectivity and communications from controller to web enabled devise(s).

20-5.01C(3) Maintenance and Operations Manuals

Comply with section 20-3.01C(8).

20-5.02 MATERIALS

20-5.02A(1) Irrigation Controllers

The irrigation controllers within Department highway areas must be **ET Water** and must have two way communication by **cell phone**, Vendor must install any necessary software and conduct any initial software or proprietary website setup configuration for communications between controller(s) and any web-enabled devise (desktop computer, cell phone, laptop computer, tablet/pad, etc.).

You may obtain specified equipment listed below from:

Company: Hydro-Scape Products Inc Contact: Tim Cleesen
Address: 5805 Kerny Villa Road, San Diego, Ca. 92123-1172
Business phone number: (858) 560-1600
Email address: Tim.Cleesen@hydroscape.com>

The quoted prices and equipment are as follows (excluding sales tax and delivery):

Equipment Description	Quoted Price	Quantity Each	Extended Price	Controller Identification
48 Station Controller W/Cabinet and Service: HYDROPOINT SWMS 48STA SS CONTROLLER + 15 YEARS COMMUNICATION Model No: WTPRO2S-C-48-SPT, CIM-14Y,	8,041.74	5	40,208.70	A,C,D,E,X
Wireless Rain Sensor Model No: WT-WRS	118.14	5	590.70	A,C,D,E,X
5 year Extended Warranty Model No. XTD-WARR	520.00	5	2,600.00	A,C,D,E,X
RM REMOTE FOR NON-RM 1.00 Net 1145.65000 EA 1145.65 CONTROLS W/UNIV ADAPTER Model No. PROMAX-UA	1,145.65	1	1,145.65	--
RM 48" Extension Cord Model No. RM32EX	83.00	1	83.00	--
CST Sensor in 1.5" PVC Wireless Model No. WT-FS-150-CST	355.74	1	355.74	X

*Add Columns as required

Prices are good until **4/30/14**

20-5.02A(2) Field Equipment

1. All Controllers shall have the following specifications and capabilities:
2. Controllers shall be capable of fully automatic, semi-automatic, and manual operation using a keypad that is an integrated part of the controller. Each controller shall be capable of storing irrigation schedules, monitor and manage flow all without the Central System (i.e. if the Central System is turned off, removed, or if communication from/to the Central Computer fails, the field controllers will continue to perform weather and flow management functions).
3. The Controller shall be able to run at least 7 valves simultaneously (programs, manual, master valve, pump start) by using at least a 3.0 amp 24VAC transformer. Each terminal output can draw up to 1 amp before being considered "over current". The controller must be support a System Over Current feature which automatically delays one stations irrigation if the activated stations are drawing too much current.
4. Backlit Display shall have a minimum of 3 lines by 24 characters so that scrolling through menus is minimized. The display shall allow the user to easily move from screen to screen through an intuitive, self-prompting display so that it is easier for the user to program, read and understand the controller. The System shall display an area description for each station including the station's location, the type of plant material irrigated and type of irrigation equipment used.
5. The Controller shall have the built-in capacity for sensing flow via a flow meter input and utilizing a master valve without the addition of sensor boards, decoders, or other pieces of equipment.
6. There shall be a minimum of 4 regular irrigation start / stop programs. Individual station cycle and soak times should be automatically calculated for each hydrozone by the controller scheduling engine. Second start times for each program must be available to support I syringe/propagation events.
7. The System shall have a water budget feature that provides monthly water volume allotments proportionate to historical evapo-transpiration (ET) which is interactive with all programs, and able to alert the user (via on screen alarms) when the controllers' water usage is more than the user set water budget.
8. Shall be EPA WaterSense Approved.
9. Programming shall be based on a station level calculated depletion with up to 28 days between irrigation cycles or shall be able to irrigate in minutes and as a percentage of ETo.
10. The Controller shall be able to receive real-time weather data directly from an ET service, and as a stand-alone controller automatically use the data to calculate appropriate run times for each station without use of a central control system.
11. The Controller shall have flow management capability as a standard feature whereas the controller shall learn each station's expected GPM flow rate, and operate up to 4 valves at the same time plus the master valve to shorten the water window.
12. Alerts shall be able to be processed and responded to at both the field controller location and at the remotely via a web browser.
13. When an alert, such as High Flow is indicated on the controller, the station with the High Flow shall still have an option to come on and then shut off, rather than having the alert keep the station off until someone clears the alert from the central computer or at the field controller.
14. The Controller shall have built-in amperage meter to accurately measure and diagnose valve solenoid electrical problems such as "no current," "station short," "under current," "over current," etc.
15. The Controller shall have an irrigation test program or "walk-thru" program that is directly controlled by the user either via a ProMax remote or Mobile Application.
16. The System shall be capable of allowing the user to make changes to the irrigation program via either a web-enabled Internet device, or at the field controller without requiring the user to go back to the Internet management portal to accept the change.
17. The Controller shall allow for operator-set water window, which prevents irrigation from continuing beyond a set end time. Remaining run-times shall be carried in a hold-over table and shall be applied at the next scheduled irrigation with the system prioritizing which valve to operate based on accumulated ET and the hold-over time.
18. The controller shall have the ability to track and report on when an "individual" user is logged into the controller via the Internet, what changes were made while there, and when a user logged out of the controller. These shall be date and time stamped. Changes made at the controller must also be logged.
19. The controller shall be able to display for the user a detailed water usage report categorizing for each month the usage during scheduled irrigation, test and manual key operation, and for non-controller usage such as bleeding valves on manually, using quick couplers or hose bibs.

20. The Field Controller(S) shall be capable of utilizing cellular wireless modem application as communication links to the central management system. The field controllers shall be capable of directly receiving, storing, and operating commands downloaded from the central management system. The cellular modem must utilize at least a 3G network for system performance, reliability and expanded cellular vendor coverage.
21. The field controller shall come with a 10 year warranty from the manufacturer.

20-5.02B Optional Radio Remote Receiver Board

Remote receiver board shall be built-in the controller and a handheld radio remote transmitter (ProMax or TRC Commander) will be supplied so that the end user can trouble shoot valves remotely without having to go the controller itself. The system must also allow manual irrigation via Internet-enabled tablet or smartphone. Depending on device utilized, the system must display operational information such as valve on, station description, expected and actual gallon per minute flow rates and electrical draw in amps. Station programming information such as total minutes, minutes per cycle, soak in time, expected flow rate and station square footage shall be editable via a web-enabled Internet device.

20-5.02C Flow Sensor

Each **Flow Sensor** shall have the following characteristics:

1. Housing to be a Schedule 80 polyvinyl chloride tee or bronze tee
2. Have a pulsing output that operates at 9VDC and a pulse rate that is proportionate to the GPM
3. Fully compatible with the internal interface at each field controller
4. Powered by the controller
5. Devices must be Badger Meter, Data Industrial, Creative Sensor Technologies, Netafim Hydrometer or other compatible device.
6. Several controllers, up to 6, shall be able to share one or point of connection with a single flow sensor. This option shall allow several controllers to share the irrigation programs and flow information for:
 - 6.1 Monitoring of system flows.
 - 6.2 Turning OFF valves with excessive flow rates due to broken lateral lines.
 - 6.3 Tracking water usage and comparing to a water budget.
 - 6.4 Eliminating relays when sharing pumps and master valves.
 - 6.5 Working in the field without the need for a central computer.

20-5.02C(1) Flow Sensor Cable

1. The **Flow Sensor** shall use two #14 AWG; one red, The maximum wire run between flow meter and controller shall be 2000 ft.
2. The flow meter shall send low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and shall resist any moisture entry.
3. It is intended that all wire runs between the controller and flow meter shall be direct pulls and shall have no splices. If wire splices are unavoidable, they shall be installed in a valve box with a sealing pack water proof wire connectors, with valve boxes properly labeled.
4. The communication method between controllers specified for sharing flow information shall be either hardwire cable. The hardwire cable shall be a 4 conductor communication twisted cable in conduit.
5. A field controller shall be able to interface and read up to two flow meters varying in size.
6. The controller shall to be able to read and monitor all flow rates and detect individual station problems regardless of the range of flow (GPM) on the project.

20-5.02C(2) Flow Sensor Conduit

One black in 1" PVC conduit to connect to the irrigation controller.

20-5.02D Weather Monitoring

A weather service, which uses both NOAA stations and CIMIS data, will deliver the ET messages over a wireless communication network.

20-5.02E Irrigation Controller Enclosure Cabinets

1. Irrigation Controller Enclosure cabinet dimensions for a single irrigation controller must be 38 inches high by 16 inches wide by 15.5 inches deep.
2. The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304-grade stainless steel, and the top shall be 12 gauge and the body 18 gauge. The main housing shall be louvered upper and lower body to allow for cross flow ventilation. A stainless steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The stainless steel backboard shall be mounted on four stainless steel bolts that will allow for easy removal of the backboard.
3. The 38-inch height with flip top shall provide easy access for programming from a standing position under normal installations.
4. The pre-assembled vandal resistant enclosure factory pre-assembled and supplied by controller manufacturer shall come complete with lightning and surge protection and all terminals shall be factory labeled. The pre-assembled enclosure shall come provided with an On/Off switch to isolate the controller along with a GFI receptacle. The enclosure shall include key lock assembly.
5. Factory pre-assembled enclosure with controller shall carry a full UL listing.
6. Controller manufacturer shall offer a double-wide pre-assembled enclosure for 2 controller placements side by side. All necessary wiring between the 2 controllers shall be pre-wired by manufacturer for easy installation
7. The factory pre-assembled enclosures shall carry a 10 year warranty, expandable to 15 year at customer option.
8. Irrigation controller enclosure cabinet dimensions for double irrigation controller must be 36 inches high by 18 inches wide by 24 inches deep.
9. Irrigation controller enclosure cabinets must be fabricated of stainless steel.
10. Irrigation controller enclosure cabinet doors must not be furnished with integral door locks. Irrigation controller enclosure cabinet door handles must allow padlocking in the latched position. The padlock is furnished by the Engineer.
11. Fabricate mounting panels with stainless steel metal sheets with a minimum thickness of 0.157 inch.

20-5.02E(1) Concrete

Controller Pad Concrete must comply with section 20-3.02D.

20-5.03 CONSTRUCTION

20-05.03A General

Finish exposed top surfaces of concrete foundations and pads with a medium broom finish applied parallel to the long dimension of foundations and pads.

20-5.04 PAYMENT

The contract lump sum price for Irrigation Controller Field Assembled Components includes compensation for all labor, materials, tools, equipment and incidentals installation, of field assembled materials as shown on the plans as specified in standard specifications, as specified in these special provisions, and as directed by the Engineer.

Replace section 20-6 with:

20-6 REMOTE IRRIGATION CONTROL SYSTEM FUNCTIONAL TEST

20-6.01 GENERAL

20-6.01A Summary

Section 20-6 includes specifications for performing remote irrigation control system functional testing.

20-6.01B Definitions

RICS: Remote Irrigation Control System

20-6.01C Submittals

Submit a report containing the flow rate for each remote control valve after Stage 2 RICS testing.

20-6.01C(1) Notification

Notify the Engineer at least 15 business days prior to stage 1 and stage 2 RICS testing.

20-6.02 MATERIALS

Not used.

20-6.03 CONSTRUCTION

20-6.03A General

Functional tests are required for each irrigation controller and associated automatic irrigation system components served by a single electric point, or a group of irrigation controllers and associated automatic irrigation system components served by a single electric service point.

The Engineer determines the length of the cycle.

Functional tests for the remote irrigation controller system (RICS) and associated automatic irrigation systems shall conform to the provisions in Section 20-5.027J, "Testing," of the Standard Specifications and these special provisions

20-6.03B RICS Testing

Unsatisfactory performance of tested irrigation system components must be repaired and rechecked through one complete cycle of operation until satisfactory performance is obtained. Repairs will be at your expense.

20-6.03B(1) Stage 1 RICS Testing

Stage one functional testing must:

1. The Contractor shall notify the Engineer not less than 2 weeks prior to starting the functional tests for the remote irrigation control system.
2. Testing the irrigation controllers and associated automatic irrigation systems and be performed without connection to the web base server
3. Be satisfactorily completed before planting plants.
4. Demonstrate to the Engineer, through one complete cycle of operation in the automatic mode, that the associated automatic components of the irrigation system operate properly.
5. Associated automatic components shall include, but not limited to, new and existing remote control valve actuator systems, irrigation controllers, remote control valves, conductors, flow sensors, and rain sensors. Associated automatic components for the second test shall include, but not be limited to, new and existing irrigation software programs, cellular phone, existing trunked radio transmission systems, and flow alarms for high, low, zero, and maximum mainline flows.
6. Upon completion of a satisfactory functional test, and correction of the deficiencies, the plants to be planted in the areas watered by the irrigation system may be planted, provided the planting areas have been prepared as specified in these special provisions.

20-6.03B(2) Stage 2 RICS Testing

Stage two functional testing must:

1. The Contractor shall notify the Engineer not less than 2 weeks prior to starting the functional tests for the remote irrigation control system.
2. Be satisfactorily completed after Stage 1 and before the start of the plant establishment period.
3. Testing the irrigation controllers and associated automatic irrigation systems and be performed while connected to the RICS web based server.
4. Demonstrate to the Engineer, over a period of not less than 7 days of consecutive automatic operation, that the irrigation controllers and associated automatic irrigation components operate properly when connected to the web base server.
5. Test all facilities from Stage 1 and the following:
 - 5.1 Software programs.
 - 5.2 Telephone or Wireless service.
 - 5.3 Web-based communications from a web-enabled device(s) (i.e, cellular phone, laptop, desktop computer, pad/tablet).
6. Test the web based application to detect and report the following:
 - 6.1 Supply line (main) pipe and remote control valve master flow alarms.

- 6.2 Confirm ET and rain automatic adjustments.
- 6.3 Upload/download irrigation schedule:
 - 6.3.1 Provide a remote irrigation controller system watering schedule shall be submitted for each irrigation controller (field unit) to the Engineer.
 - 6.3.2 The Engineer will enter the watering schedule into the irrigation software program, and a computer printout will be made available to the Contractor for verification.
 - 6.3.3 If the Engineer determines the submitted watering schedule is unacceptable, a revised watering schedule shall be submitted to the Engineer for approval within 5 working days.
- 7. If existing and new automatic components of the irrigation systems, web application, fail a functional test, the components shall be repaired. Testing shall be repeated until satisfactory operation is obtained.
- 8. Upon completion of a satisfactory test, including correction of deficiencies, the plant establishment period may begin, provided planting work as specified in these special provisions has been completed except for plant establishment work.

20-6.04 PAYMENT

The work performed in connection with testing RICS function testing shall be considered as included in the contract lump sum price paid for Irrigation Controller Function Test (2 stages) and no additional compensation will be allowed therefor.

Replace the 2nd paragraph of section 20-7.01B(1) with:

At least 60 days before planting the plants, submit a statement from the vendor that the order for the plants required for this Contract, including sample plants used for inspection, has been received and accepted by the vendor. The statement from the vendor must include the names, sizes, and quantities of plants ordered and the anticipated delivery date.

Replace "Reserved" in section 20-7.02D(1)(d) with:

Organic fertilizer must be one of the following and comply with the requirements of the following table:

Organic Fertilizer

Product	Guaranteed chemical analysis (N-P-K) (%)	Company
Biosol Mix®	7-2-3	Rocky Mountain Bio-Products Denver, CO
Fertil-Fibers™	6-4-1	Quattro Environmental, Inc. Coronado, CA
Sustane®	5-2-4	Sustane Natural Fertilizer, Inc. Cannon Falls, MN
Or equal ^a	(N) 5 to 7 (P) 1 to 5 (K) 1 to 10	--

^aOr equal must be pelleted or granular and be within the ranges shown for N-P-K. The cumulative (N) release rate must be no more than 70 percent the first 70 days after incubation (86 degrees F) with 100 percent at 350 days or more.

Add between the 3rd and 4th paragraphs of section 20-7.03B(1):

Dispose of removed existing plants or reduce to chips and spread within the job site. Spread chipped material at locations determined by the Engineer. Chipped material must not be substituted for mulch, nor must the chipped material be placed within areas to receive mulch.

Add to section 20-7.03B(2):

Weeds must be killed within ground cover areas and within the area extending beyond the outer limits of the ground cover areas to the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, existing planting, and fences. At those locations where ground cover areas are 12 feet or more from the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, and fences, the clearing limit must be 6 feet beyond the outer limits of the ground cover areas.

Weeds must be killed within mulch areas and within the area extending beyond the outer limits of the mulch areas to the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, existing planting and fences. At those locations where mulch areas are 12 feet or more from the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, and fences, the clearing limit must be 6 feet beyond the outer limits of the mulch areas.

Weeds must be killed within 2 feet of the edges of paved shoulders, dikes, curbs, and sidewalks.

Weeds must be killed within planting areas where plants are to be planted in groups or rows 15 feet or less apart and from within an area extending 6 feet beyond the outer limits of the groups or rows of plants.

Weeds must be killed within an area 6 feet in diameter centered at each plant location where the plants are to be planted more than 15 feet apart and are located outside of ground cover areas.

Weeds must be killed and removed under guard rails, from within areas where asphalt concrete surfacing, concrete surfacing, rock blankets, gravel mulch or decomposed granite areas are to be placed, and from within unpaved gore areas between the edge of pavement and planting areas as shown.

Existing ground cover must be killed and removed from within an area 6 foot in diameter centered at each plant location within existing ground cover areas.

Replace the 1st paragraph in section 20-7.03B(2) with:

Dispose of weeds killed during the initial roadside clearing.

Add to section 20-7.03C:

Plants adjacent to drainage ditches must be located so that after construction of the basins, no portion of the basin wall is less than the minimum distance shown for each plant involved.

Replace "Reserved" in section 20-7.03G with:

Do not perform planting work in cultivated areas for a period of 21 days after:

1. Cultivation is complete
2. Irrigation systems have been installed
3. Plant holes have been excavated and backfilled

For cultivated areas, keep the soil sufficiently moist to germinate weeds. Weeds that germinate must be killed.

Add to section 20-7.03I(1):

A granular preemergent must be applied to areas to be covered with mulch outside of plant basins.

Add to section 20-7.04:

The Department withholds 50 percent of the estimated value of highway planting work done until a statement from the vendor is submitted that shows the order for the plants required for this Contract has been placed.

Add to section 20-9.01A:

The plant establishment period must be Type 2.

Add to section 20-9.03C:

Apply organic fertilizer to the plants during the 1st week of March and September of each year.

Add to section 20-9.03D:

If ordered, apply 1 application of a preemergent pesticide between 40 and 50 working days before completion of the plant establishment period. This work is change order work.

Control weeds by:

1. Hand pulling:
 - 1.1. In plant basins and on basin walls
 - 1.2. In ground cover planting areas without plant basins
2. Killing:
 - 2.1. In mulched areas and ground cover planting areas outside of plant basins
 - 2.2. In planting areas without ground cover plantings or located outside of ground cover areas
 - 2.3. In ground cover planting areas without plant basins
 - 2.4. Within medians, pavement, curbs, sidewalks, and other surfaced areas

Replace the 4th paragraph of section 20-9.03J with:

Foliage protectors are not required to be removed.

Replace "Reserved" in section 20-12.02D with:

Rock must be clean, smooth, and obtained from a single source and must comply with the following grading requirements:

Grading Requirements

Screen size (inches)	Percentage passing
8	100
6	50-85
4	0-50

Replace "Reserved" in section 20-12.03A with:

Before performing rock blanket work, clear areas to receive the rock blanket under section 20-7.03B.

After clearing, grade areas to receive rock blanket to a smooth, uniform surface, and compact to not less than 90 percent relative compaction. Place rock blanket on compacted original ground.

Rock blanket must not be placed to within the minimum distance shown from ground cover areas and other plants.

Add to section 27:
27-4 BASE BOND BREAKER

27-4.01 GENERAL

27-4.01A Summary

Section 27-4 includes specifications for placing base bond breaker between concrete pavement and either concrete bases or cement treated bases.

Base bond breaker must be placed on the base surface before paving.

27-4.01B Definitions

Not Used

27-4.01B Submittals

Submit a certificate of compliance for each lot of base bond breaker material delivered.

27-4.01B Quality Control and Assurance

Not Used

27-4.02 MATERIALS

Base bond breaker no. 1 must be PG asphalt binder, Grade PG 64-10.

Base bond breaker no. 2 must be curing compound no. 3.

Base bond breaker no. 3 must be white opaque polyethylene film under ASTM C 171 except the minimum thickness must be 6 mils.

Base bond breaker no. 4 must be white curing paper under ASTM C 171.

Base bond breaker no. 5 must be geosynthetic bond breaker. Geosynthetic bond breaker must be nonwoven; needle punched; not heat treated; polypropylene, polyethylene material.

When tested under the referenced test methods, properties of geosynthetic bond breaker material must have the values shown in the following table:

Geosynthetic Bond Breaker		
Property	Test	Value
Mass per unit area, oz/sq yd min	ASTM D 5261	14.7
Thickness at 29 psi, mm min	ASTM D 5199	1.0
Tensile strength at ultimate, lbs/ft min	ASTM D 4595	685
Elongation, percent max	ASTM D 4595	130
Permittivity at 2.9 psi, m/s min	ASTM D 5493	0.0001
Hydraulic transmissivity at 29 psi, m/s min	ASTM D 6574	0.0002
Ultraviolet resistance, percent min retained grab breaking load, 500 hours	ASTM D 4355	60

Use base bond breaker no. 1, 2 or 5 on concrete base and LCB.

Use base bond breaker no.3, 4, or 5 on lean concrete base rapid setting, CTPB, and rapid strength concrete base.

27-4.03 CONSTRUCTION

27-4.03A General

Before placing base bond breaker, remove foreign and loose materials from the base.

Do not place base bond breaker until the base has cured. Allow base bond breaker nos. 1 and 2 to cure before paving.

Base bond breaker must be covered with pavement within 72 hours.

27-4.03B Placing Base Bond Breaker

Apply base bond breaker no. 1 in one application at a uniform rate from 0.09 to 0.15 gal/sq yd over the entire base surface area. Do not add water to bond breaker. Allow at least 4 hours for curing.

Comply with Section and 90-1.03B(3)(c) for mixing base bond breaker no. 2. Apply base bond breaker no. 2 at a uniform rate of at least 0.12 gal/sq yd over the entire base surface area. You may apply base bond breaker in more than one coat. Allow at least 4 hours for curing.

Base bond breakers no. 3 and 4 must not be wrinkled. Overlap adjacent sheets a minimum of 6 inches and in the same direction as the concrete pour. Tape or bond the sheets together as needed to prevent sheets from folding or wrinkling. Secure the bond breaker sufficiently so that it remains in place during concrete pavement placement. Ensure that no concrete gets under the bond breaker.

Base bond breaker no. 5 must not be wrinkled. Overlap adjacent sheets a minimum of 8 inches in the same direction as the concrete pour. Overlap no more than three layers at any location. Secure bond breaker to the base with pins or nails punched through galvanized washers or discs 2–2.75-inches in diameter spaced less than 6 ft apart in each direction except along edges spacing must be less than 3 ft. If bond breaker moves or wrinkles while placing concrete pavement increase the frequency of fasteners. Ensure that no concrete gets under the bond breaker.

27-4.04 PAYMENT

If base bond breaker dimensions are shown, base bond breaker is measured based on the dimension shown.

The Department does not pay for overlaps of base bond breaker material.

AA

28 CONCRETE BASES

Replace the 4th paragraph of section 28-2.02 with:

The portland cement content of concrete base must be at least 340 lb/cu yd except, after testing samples from the proposed aggregate supply an increase in the cement content may be ordered. Compensation for an ordered increase is specified in section 28-2.04.

Add to section 28-2.02:

At your option, aggregate for concrete base must comply to either the provisions specified for LCB in section 28-2.02 or the provisions specified for concrete in section 90-1.02C and section 90-1.02C(4).

Add to section 28-2.02:

The combined aggregate grading used in concrete base must be the 1-inch maximum grading.

Add to section 28-2.03E:

Spread and shape concrete base using suitable powered finishing machines and supplement with hand work as necessary. Consolidate concrete base using high-frequency internal vibrators within 15 minutes after the base is deposited on the subgrade. Vibrate with care such that adequate consolidation occurs across the full paving width. Do not use vibrators for extensive weight shifting of the concrete base. Use methods of spreading, shaping, and compacting that produce a dense homogenous base conforming to the required cross section. Methods that result in segregation, voids, or rock pockets must be discontinued.

AA

DIVISION V SURFACINGS AND PAVEMENTS
39 HOT MIX ASPHALT

Add to section 39-1.01:

Produce and place HMA Type A under the QC/QA construction process.

Produce and place HMA-O under the Method construction process.

Produce and place RHMA-G under the Standard construction process.

Add to section 39-1.02C:

Asphalt binder used in HMA Type A must be PG 64-10.

Asphalt binder used in HMA-O must be PG 64-10.

Asphalt binder mixed with asphalt modifier and CRM for asphalt rubber binder must be PG 64-16.

Add to section 39-1.02E:

Aggregate used in HMA Type A must comply with the 3/4-inch HMA Types A and B gradation.

Aggregate for HMA-O must comply with the 1/2-inch OGFC gradation.

Aggregate for RHMA-G must comply with the 3/4-inch RHMA-G gradation.

Add to section 39-1.03B:

For the mix design of HMA Type A produced under the QC/QA construction process, determine the plasticity index of the aggregate blend under California Test 204. Choose an antistrip treatment and use the corresponding laboratory procedure for the mix design based on the antistrip treatments shown in the following table:

Antistrip Treatment Laboratory Procedures for Mix Design	
Antistrip treatment	Laboratory procedure
Plasticity index from 4 to 10 ^a	
Dry hydrated lime with marination	LP-6
Lime slurry with marination	LP-7
Plasticity index less than 4	
Liquid	LP-5
Dry hydrated lime without marination	LP-6
Dry hydrated lime with marination	LP-6
Lime slurry with marination	LP-7

^a If the plasticity index is greater than 10, do not use that aggregate blend.

For the mix design of HMA Type A produced under the QC/QA construction process, determine the tensile strength ratio under California Test 371 on untreated HMA. If the tensile strength ratio is less than 70:

1. Choose from the antistrip treatments specified based on the plasticity index
2. Test treated HMA under California Test 371
3. Treat to a minimum tensile strength ratio of 70

For the mix design of RHMA-G produced under the QC/QA construction process:

1. Determine the tensile strength ratio under California Test 371 on untreated RHMA-G. Comply with the following:
 - 1.1. If the test result is greater than or equal to 70, the Engineer does not require further tensile strength ratio testing or plasticity index testing for mix design.
 - 1.2. If the tensile strength ratio for untreated RHMA-G is less than 70:
 - 1.2.1. Determine the plasticity index of the aggregate blend under California Test 204.
 - 1.2.2. Choose an antistrip treatment based on the table titled "Antistrip Treatment Laboratory Procedures for Mix Design" and treat RHMA-G.
 - 1.2.3. Determine the tensile strength ratio under California Test 371 on treated RHMA-G.
2. If the tensile strength ratio testing for treated RHMA-G is greater than or equal to 70, use that antistrip treatment in the mix design.
3. If the tensile strength ratio testing for treated RHMA-G is less than 70, the minimum tensile strength specification is waived, but you must use any of the following:
 - 3.1. HMA aggregate lime treatment – slurry method.
 - 3.2. HMA aggregate lime treatment – dry hydrated lime method, with or without marination.
 - 3.3. Liquid antistrip treatment using 0.5 percent liquid antistrip.

Determine the OBC for RHMA-G at 5.0 percent air voids under California Test 367. The OBC must be greater than or equal to 7.5 based on the total weight of mix.

The Engineer determines the OBC under California Test 368.

Do not test HMA Type A aggregate for plasticity index and tensile strength ratio.

Replace the 2nd, 3rd, and 4th paragraphs of section 39-1.11B(1) of the RSS for section 39-1.11 with:

Place HMA on adjacent traveled way lanes so that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place Kraft paper or another authorized bond breaker under the conform tapers to facilitate the taper removal when paving operations resume.

Delete section 39-1.11B(2) of the RSS for section 39-1.11.

Add to section 39-1.11D of the RSS for section 39-1.11:

Pave shoulders and median borders adjacent to the lane before opening a lane to traffic.

Add to section 39-1.13:

HMA placed on the bridge deck must be Type A.

Asphalt binder must be Grade PG 64-10.

Replace the 2nd through 4th paragraphs of section 39-1.15C with:

Spread with a self-propelled spreader. After spreading, minor HMA must be ready for compacting without further shaping.

Compact with a vibratory roller providing a minimum of 7,000 lb centrifugal force. With the vibrator on, compact at least 3 complete coverages over each layer, overlapping to prevent displacement. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the layer thickness is less than 0.08 foot, turn the vibrator off. Complete the 1st coverage before the mixture's temperature drops below 250 degrees F.

The finished surface must be:

1. Textured uniformly
2. Compacted firmly
3. Without depressions, humps, and irregularities
4. In compliance with the straightedge specifications for smoothness

Replace section 39-1.17 with:

39-1.17 DATA CORES

39-1.17A General

39-1.17A(1) Summary

This work includes taking data cores and submitting the information.

Three business days before starting coring, submit proposed methods and materials for backfilling data core holes.

39-1.17A(2) Submittals

Submit the following to the Engineer and to Coring@dot.ca.gov:

1. Summary of data cores taken
2. Photograph of each data core

For each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:
 - 7.1 1/2 inch for recovered material
 - 7.2 1.0 inch for unstabilized material
8. Location including:
 - 8.1. County
 - 8.2. Route
 - 8.3. Post mile
 - 8.4. Lane number
 - 8.5. Lane direction
 - 8.6. Station

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. Core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

39-1.17B Materials

Not Used

39-1.17C Construction

Take data cores that include the completed HMA pavement, underlying base, and subbase material. Protect data cores and surrounding pavement from damage.

Take 4- or 6-inch-diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material, but you must identify the material. Unstabilized material includes:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

After submitting the data core summary and photograph, dispose of cores.

Replace section 39-1.18 with:

39-1.18 HOT MIX ASPHALT AGGREGATE LIME TREATMENT—DRY LIME METHOD

39-1.18A General

39-1.18A(1) Summary

Treat HMA aggregate with lime using the dry lime method either with marination or without.

39-1.18A(2) Submittals

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed JMF.

If marination is required, submit the averaged aggregate quality test results within 24 hours of sampling.

Submit a treatment data log from the dry lime and aggregate proportioning device in the following order:

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. HMA type and mix aggregate size
5. Wet aggregate flow rate collected directly from the aggregate weigh belt
6. Aggregate moisture content, expressed as a percent of the dry aggregate weight
7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
8. Dry lime flow rate
9. Lime ratio from the accepted JMF for each aggregate size being treated
10. Lime ratio from the accepted JMF for the combined aggregate
11. Actual lime ratio calculated from the aggregate weigh belt output, the aggregate moisture input, and the dry lime meter output, expressed as a percent of the dry aggregate weight
12. Calculated difference between the authorized lime ratio and the actual lime ratio

Each day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

39-1.18A(3) Quality Control and Assurance

If marination is required, the QC plan must include aggregate quality control sampling and testing during lime treatment. Sample and test in compliance with minimum frequencies shown in the following table:

Aggregate Quality Control During Lime Treatment

Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent	California Test 217	Once per 1,000 tons of aggregate treated with lime
Percent of crushed particles	California Test 205	As necessary and as designated in the QC plan
Los Angeles Rattler	California Test 211	
Fine aggregate angularity	California Test 234	
Flat and elongated particles	California Test 235	

Note: During lime treatment, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Run tests for aggregate quality in triplicate and report test results as the average of 3 tests.

For any of the following, the Engineer orders proportioning operations stopped if you:

1. Do not submit the treatment data log
2. Do not submit the aggregate quality control data for marinated aggregate
3. Submit incomplete, untimely, or incorrectly formatted data
4. Do not take corrective actions
5. Take late or unsuccessful corrective actions
6. Do not stop treatment when proportioning tolerances are exceeded
7. Use malfunctioning or failed proportioning devices

If you stop treatment, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

39-1.18B Materials

High-calcium hydrated lime and water must comply with section 24-2.02.

Before virgin aggregate is treated, it must comply with the aggregate quality specifications. Do not test treated aggregate for quality control except for gradation. The Department does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated the aggregate.

Treated aggregate must not have lime balls or clods.

39-1.18C Construction

39-1.18C(1) General

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

Marinate aggregate if the plasticity index determined under California Test 204 is from 4 to 10.

If marination is required:

1. Treat and marinate coarse and fine aggregates separately.
2. Treat the aggregate and stockpile for marination only once.
3. Treat the aggregate separate from HMA production.

The lime ratio is the pounds of dry hydrated lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

Aggregate gradations must have the lime ratio ranges shown in the following table:

Aggregate gradation	Lime ratio percent
Coarse	0.4–1.0
Fine	1.5–2.0
Combined	0.8–1.5

You may reduce the combined aggregate lime ratio for OGFC to 0.5–1.0 percent.

The lime ratio for fine and coarse aggregate must be within ± 0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ± 0.2 percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions.

Proportion dry lime by weight with a continuous operation.

The device controlling dry lime and aggregate proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by a data set is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the controller.

If 3 consecutive sets of recorded treatment data indicate deviation more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the day's treated aggregate in HMA.

If you stop treatment for noncompliance, you must implement corrective action and successfully treat aggregate for a 20-minute period. Notify the Engineer before beginning the 20-minute treatment period.

If you use a batch-type proportioning operation for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment operation from HMA batching operations including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If using a continuous mixing operation for HMA without lime marinated aggregates, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the quantity of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for the lime treatment operation in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with California Test 109.

At the time of mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water for mixing and coating aggregate to the aggregate before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from aggregate.

The HMA plant must be equipped with a bag-house dust system. Material collected in the dust system must be returned to the mix.

39-1.18C(2) Mixing Dry Lime and Aggregate

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate. Store dry lime in a uniform and free-flowing condition. Introduce dry lime to the pugmill in a continuous operation. The introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

If marination is required, marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated more than 60 days.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment operation is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

39-1.18D Payment

Payment for dry lime treating the aggregate, including marination, is included in payment for the HMA involved.

Replace section 39-1.19 with:

39-1.19 HOT MIX ASPHALT AGGREGATE LIME TREATMENT—SLURRY METHOD

39-1.19A General

39-1.19A(1) Summary

Treat HMA aggregate with lime using the slurry method and place it in stockpiles to marinate.

39-1.19A(2) Submittals

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed JMF.

Submit the averaged aggregate quality test results to the Engineer within 24 hours of sampling.

Submit a treatment data log from the slurry proportioning device in the following order:

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. Wet aggregate flow rate collected directly from the aggregate weigh belt
5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
6. Dry aggregate flow rate calculated from the wet aggregate flow rate
7. Lime slurry flow rate measured by the slurry meter
8. Dry lime flow rate calculated from the slurry meter output
9. Authorized lime ratio for each aggregate size being treated
10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
11. Calculated difference between the authorized lime ratio and the actual lime ratio
12. Dry lime and water proportions at the slurry treatment time

Every day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

39-1.19A(3) Quality Control and Assurance

The QC plan must include aggregate quality control sampling and testing during aggregate lime treatment. Sample and test in compliance with frequencies in the following table:

Aggregate Quality Control During Lime Treatment

Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent	California Test 217	Once per 1,000 tons of aggregate treated with lime
Percent of crushed particles	California Test 205	As necessary and as designated in the QC plan
Los Angeles Rattler	California Test 211	
Fine aggregate angularity	California Test 234	
Flat and elongated particles	California Test 235	

Note: During lime treatment, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Run tests for aggregate quality in triplicate and report test results as the average of 3 tests.

For any of the following, the Engineer orders proportioning operations stopped if you:

1. Do not submit the treatment data log
2. Do not submit the aggregate quality control data
3. Submit incomplete, untimely, or incorrectly formatted data
4. Do not take corrective actions
5. Take late or unsuccessful corrective actions
6. Do not stop treatment when proportioning tolerances are exceeded
7. Use malfunctioning or failed proportioning devices

If you stop treatment, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

For the aggregate to be treated, determine the moisture content at least once during each 2 hours of treatment. Calculate moisture content under California Test 226 or 370 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

39-1.19B Materials

High-calcium hydrated lime and water must comply with section 24-2.02.

Before virgin aggregate is treated, it must comply with the aggregate quality specifications. Do not test treated aggregate for quality control except for gradation. The Engineer does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated the aggregate. If RAP is used, the Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

Treated aggregate must not have lime balls or clods.

39-1.19C Construction

39-1.19C(1) General

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Treat aggregate separate from HMA production.

Do not treat RAP.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to from 2 to 3 parts water by weight. The slurry must completely coat the aggregate.

Lime treat and marinate coarse and fine aggregates separately.

Immediately before mixing lime slurry with the aggregate, water must not visibly separate from the aggregate.

Treat the aggregate and stockpile for marination only once.

The lime ratio is the pounds of dry hydrated lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

The following aggregate gradations must have the lime ratio ranges shown in the following table:

Aggregate gradation	Lime ratio percent
Coarse	0.4–1.0
Fine	1.5–2.0
Combined virgin aggregate	0.8–1.5

You may reduce the combined aggregate lime ratio for OGFC to 0.5–1.0 percent.

The lime ratio for fine and coarse aggregate must be within ± 0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ± 0.2 percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If 3 consecutive sets of recorded treatment data indicate deviation more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the day's total treatment in HMA.

If you stop treatment for noncompliance, you must implement corrective action and successfully treat aggregate for a 20-minute period. Notify the Engineer before beginning the 20-minute treatment period.

39-1.19C(2) Lime Slurry Proportioning

Proportion lime and water with a continuous or batch operation.

The device controlling slurry proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by the data set is the quantity produced 5 minutes before and 5 minutes after the capture time. For the Contract's duration, collected data must be stored by the controller.

39-1.19C(3) Proportioning and Mixing Lime Slurry Treated Aggregate

Treat HMA aggregate by proportioning lime slurry and aggregate by weight in a continuous operation.

Marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

39-1.19D Payment

Payment for treating aggregates with lime slurry is included in payment for the HMA involved.

Replace section 39-1.20 with:

39-1.20 LIQUID ANTISTRIP TREATMENT

39-1.20A General

39-1.20A(1) Summary

Treat asphalt binder with liquid antistrip (LAS) treatment to bond the asphalt binder to aggregate in HMA.

39-1.20A(2) Submittals

For LAS, submit with the proposed JMF submittal:

1. MSDS
2. One 1-pint sample
3. Infrared analysis including copy of absorption spectra

Submit a certified copy of test results and an MSDS for each LAS lot.

Submit a certificate of compliance for each LAS shipment. With each certificate of compliance, submit:

1. Your signature and printed name
2. Shipment number
3. Material type
4. Material specific gravity
5. Refinery
6. Consignee
7. Destination
8. Quantity
9. Contact or purchase order number
10. Shipment date

Submit proportions for LAS as part of the JMF submittal. If you change the brand or type of LAS, submit a new JMF.

For each job site delivery of LAS, submit one 1/2-pint sample to METS. Submit shipping documents to the Engineer. Label each LAS sampling container with:

1. LAS type
2. Application rate
3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow sufficient fields for the specified data. Include data titles at least once per report. For each mixing operation type, submit in order:

1. Batch mixing:
 - 1.1. Production date
 - 1.2. Time of batch completion
 - 1.3. Mix size and type
 - 1.4. Each ingredient's weight
 - 1.5. Asphalt binder content as a percentage of the dry aggregate weight
 - 1.6. LAS content as a percentage of the asphalt binder weight
2. Continuous mixing:
 - 2.1. Production date
 - 2.2. Data capture time
 - 2.3. Mix size and type
 - 2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
 - 2.5. Aggregate moisture content as percentage of the dry aggregate weight
 - 2.6. Flow rate of asphalt binder collected from the asphalt binder meter
 - 2.7. Flow rate of LAS collected from the LAS meter
 - 2.8. Asphalt binder content as percentage of total weight of mix calculated from:

- 2.8.1. Aggregate weigh belt output
- 2.8.2. Aggregate moisture input
- 2.8.3. Asphalt binder meter output
- 2.9. LAS content as percentage of the asphalt binder weight calculated from:
 - 2.9.1. Asphalt binder meter output
 - 2.9.2. LAS meter output

39-1.20A(3) Quality Control and Assurance

For continuous mixing and batch mixing operations, sample asphalt binder before adding LAS. For continuous mixing operations, sample combined asphalt binder and LAS after the static mixer.

The Engineer orders proportioning operations stopped for any of the following if you:

1. Do not submit data
2. Submit incomplete, untimely, or incorrectly formatted data
3. Do not take corrective actions
4. Take late or unsuccessful corrective actions
5. Do not stop production when proportioning tolerances are exceeded
6. Use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

39-1.20B Materials

LAS-treated asphalt binder must comply with the specifications for asphalt binder in section 39-1.02C. Do not use LAS as a substitute for asphalt binder.

LAS total amine value must be 325 minimum when tested under ASTM D 2074.

Use only 1 LAS type or brand at a time. Do not mix LAS types or brands.

Store and mix LAS under the manufacturer's instruction.

39-1.20C Construction

LAS must be from 0.5 to 1.0 percent by weight of asphalt binder.

If 3 consecutive sets of recorded production data show actual delivered LAS weight is more than ± 1 percent of the authorized mix design LAS weight, stop production and take corrective action.

If a set of recorded production data shows actual delivered LAS weight is more than ± 2 percent of the authorized mix design LAS weight, stop production. If the LAS weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the plant controller or a computer's memory at the plant.

39-1.20D Payment

Payment for treating asphalt binder with LAS is included in payment for the HMA involved.

Replace "Reserved" in section 39-1.25 with:

39-1.25A General

39-1.25A(1) Summary

Section 39-1.25 includes specifications for producing and placing rubberized bonded wearing course—gap graded (RBWC-G).

The specifications for RHMA-G apply to the HMA used in RBWC-G. The Standard construction process applies.

39-1.25A(2) Definitions

rubberized bonded wearing course—gap graded: RHMA-G placed over a membrane of polymer-modified asphaltic emulsion in a single pass with an integrated paving machine.

39-1.25A(3) Submittals

With the JMF submittal, submit the target residual rate for the asphaltic emulsion membrane.

Within 3 business days following the 1st delivery, submit test results for the asphaltic emulsion properties performed on a sample taken from the asphaltic emulsion delivered.

Within 1 business day of each job site delivery of asphaltic emulsion, submit to METS a 2-quart sample and a certificate of compliance. Ship each sample so that it is received at METS within 48 hours of sampling. Label each asphaltic emulsion sampling container with:

1. Emulsion producer and location
2. Asphaltic emulsion type
3. Percent of water
4. Sampling location, time, and date
5. Contract number
6. Name of the Engineer

Each day RBWC-G is placed, submit the residual and application rate for the asphaltic emulsion membrane.

During production, submit certified volume or weight slips for the materials supplied.

39-1.25A(4) Quality Control and Assurance

Sample RHMA-G from either a truck or the material transfer device (MTV) hopper.

Perform sampling and testing for RHMA-G for RBWC-G at the specified frequency for the additional quality characteristic shown in the following table:

RBWC-G Minimum Quality Control

Quality characteristic	Test method	Minimum sampling and testing frequency	Specification	Sampling location
Asphaltic emulsion membrane	Various	At least once per paving day	Specified in "Materials"	Delivery truck
	ASTM D 2995		Submitted target application rate ± 0.02 gal/sq yd	Job site

The Engineer samples RBWC-G for acceptance testing and tests for the additional quality characteristic shown in the following table:

RBWC-G Acceptance

Quality characteristic	Test method	Specification	Sampling location
Asphaltic emulsion membrane	Various	Specified in "Materials"	Delivery truck
	ASTM D 2995	Submitted target application rate ± 0.01 gal/sq yd	At the job site

Sample asphaltic emulsion under AASHTO T 40. For each job site delivery of asphaltic emulsion, take a 2-quart sample in the presence of the Engineer. Take samples from the delivery truck mid-load from a sampling tap or thief. If the sample is taken from the tap, draw and discard 4 quarts before sampling.

If you unload asphalt binder or asphaltic emulsion into bulk storage tanks, do not use material from the tanks until you submit test results for a sample taken from the bulk storage tank. Testing must be performed by an AASHTO-accredited laboratory.

39-1.25B Materials

39-1.25B(1) General

Not Used

39-1.25B(2) Asphaltic Emulsion Membrane

Asphaltic emulsion for membrane must have the properties shown in the following table:

Asphaltic Emulsion Membrane			
Properties	Test method	Requirement	
		Min	Max
Saybolt Furol Viscosity, @ 25 °C, SFS ^a	AASHTO T59	20	100
Sieve test on original emulsion (at time of delivery) (%)		--	0.05
24-hour storage stability (%)		--	1
Residue by evaporation (%)	California Test 331	63	--
Tests on residue from evaporation test:			
Torsional recovery, measure entire arc of recovery, at 25 °C (%)	California Test 332	40	--
Penetration (0.01 mm) at 25 °C	AASHTO T49	50	150

^a SFS means Saybolt Furol seconds

39-1.25B(3) Asphalt Binder

The grade of base asphalt binder for RHMA-G in RBWC-G must be PG 64-16.

39-1.25B(4) Aggregate

Aggregate for RHMA-G in RBWC-G must comply with the 1/2-inch RHMA-G gradation.

Aggregate for RHMA-G in RBWC-G must comply with the 3/8-inch RBWC-G gradation. The proposed aggregate gradation must be within the TV limits for the specified sieve sizes shown in the following table:

Aggregate Gradation (Percentage Passing) Rubberized Bonded Wearing Course—Gap Graded		
3/8-inch RBWC-G		
Sieve sizes	Target value limits	Allowable tolerance
1/2"	100	--
3/8"	78–92	TV ± 6
No. 4	28–42	TV ± 7
No. 8	15–25	TV ± 6
No. 30	5–15	TV ± 5
No. 200	2.0–7.0	TV ± 2

Before the addition of asphalt binder and lime treatment, aggregate for RHMA-G in RBWC-G must have the quality characteristics shown in the following table:

Aggregate Quality		
Quality characteristic	Test method	Requirement
Percent of crushed particles	California Test 205	90
Coarse aggregate (% min)		
Two fractured faces		85
Fine aggregate (% min) (Passing No. 4 sieve and retained on No. 8 sieve.)		
One fractured face		
Los Angeles Rattler (% max)	California Test 211	12
Loss at 100 rev.		35
Loss at 500 rev.		
Sand equivalent ^a (min)	California Test 217	47
Fine aggregate angularity (% min)	California Test 234	45
Flat and elongated particles (% max by weight @ 3:1)	California Test 235	25

^a Reported value must be the average of 3 tests from a single sample.

39-1.25B(5) Reclaimed Asphalt Pavement

Do not use RAP in bonded wearing course.

39-1.25C Hot Mix Asphalt Mix Design Requirements

39-1.25C(1) General

Not Used

39-1.25C(2) Hot Mix Asphalt for Job Mix Formula

Determine the OBC for RHMA-G at 5.0 percent air voids under California Test 367. The OBC must be greater than or equal to 7.5 based on the total weight of mix.

39-1.25D Construction

39-1.25D(1) General

Not Used

39-1.25D(2) Prepaving Conference

Attendance at the prepaving conference is mandatory for:

1. Emulsion supplier
2. Paving foreman
3. HMA supplier
4. Project superintendent
5. Project manager

39-1.25D(3) Storing

Do not store RHMA-G more than 8 hours.

39-1.25D(4) Spreading and Compacting Equipment

Use an integrated distributor-paver capable of spraying the asphaltic emulsion membrane, spreading the RHMA-G, and leveling the mat surface in 1 pass.

Apply asphaltic emulsion membrane at a uniform rate for the full paving width. The asphaltic emulsion membrane must not be touched by any part of the paver including wheels or tracks.

If the spray bar is adjusted for changing pavement widths, the paver must prevent excess spraying of asphaltic emulsion beyond 2 inches of the RHMA-G edge.

Use an MTV to receive RHMA-G directly from the truck without dumping on the ground and deliver to the paver's receiving hopper or feed system. The MTV must:

1. Remix the HMA with augers before loading the paver
2. Have sufficient capacity to prevent stopping the paver

The paver must have a full-width, heated vibratory screed that uniformly spreads and finishes the RHMA-G.

Compact RHMA-G with steel drum tandem rollers. Each roller must weigh from 126 to 172 pounds per linear inch of drum width.

39-1.25D(5) Transporting, Spreading, and Compacting

Apply asphaltic emulsion membrane on dry or damp pavement with no free water. Apply asphaltic emulsion when the atmospheric and pavement temperatures are above 50 degrees F.

Before spreading RHMA-G, apply asphaltic emulsion membrane. Apply emulsion at a temperature from 120 to 180 degrees F and in a single application at the residual rate specified for the condition of the underlying surface. Asphaltic emulsion membrane must have a target residual rate for the surfaces to receive the emulsion shown in the following table:

Asphaltic Emulsion Membrane Target Residual Rate	
Surface to receive asphaltic emulsion membrane	Target residual rates (gal/sq yd)
PCC pavement	0.09 – 0.11
Dense, compacted, new HMA pavement	0.11 – 0.14
Open textured, dry, aged or oxidized AC pavement	0.13 – 0.17

If you request and if authorized, you may change the asphaltic emulsion membrane application rates.

Spread RHMA-G after applying asphaltic emulsion membrane and before the asphaltic emulsion membrane has spread beyond the area to be covered by the RHMA-G. Do not apply asphaltic emulsion membrane more than once.

Construct a transverse joint if RHMA-G remains in the paver for more than 30 minutes.

Do not reintroduce RHMA-G spread over asphaltic emulsion membrane into the paving process.

Do not overlap or hot lap RHMA-G. Pave through lanes after paving adjacent:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets
10. Ramps

For RBWC-G placed on areas adjacent to through lanes that extend into the through lanes, cut the RBWC-G to a neat, straight vertical line at the lane line.

If you spill asphaltic emulsion into the paver hopper, stop paving and remove and dispose of the contaminated material.

When measured on the surface immediately behind the screed, the RHMA-G must be at least 280 degrees F and the temperature across the mat should not vary by more than 25 degrees F. Do not take the temperature within 2 feet of the edge of the pavement. For each paver used, compact RHMA-G with 2 coverages using 2 rollers with the vibrators turned off. Complete the 1st coverage before the surface temperature drops below 270 degrees F. Complete all compaction before the surface temperature drops below 200 degrees F.

If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the MTV. You may omit tarpaulins if the time from discharge to a truck until transfer to the MTV is less than 30 minutes.

Do not allow traffic on RBWC-G until the surface temperature is below 160 degrees F.

39-1.25D(6) Smoothness

RBWC-G must comply with the requirements for HMA smoothness in section 39-1.12.

39-1.25E Payment

RBWC-G is measured as specified for RHMA-G in section 39-6. Asphaltic emulsion membrane for RBWC-G is measured as specified for asphaltic emulsion in section 94.

Replace "Reserved" in section 39-1.27 with:

39-1.27A General

39-1.27A(1) Summary

Section 39-1.27 includes specifications for producing and placing bonded wearing course—open graded (BWC-O).

The specifications for HMA-O apply to HMA used in BWC-O. The Standard construction process applies.

39-1.27A(2) Definitions

bonded wearing course—open graded: HMA-O produced with a polymer-modified asphalt binder placed over a membrane of polymer-modified asphaltic emulsion in a single pass with an integrated paving machine.

39-1.27A(3) Submittals

With the JMF submittal, submit target residual rate for the asphaltic emulsion membrane.

Within 3 business days following the 1st delivery, submit test results for the asphaltic emulsion properties performed on a sample taken from the asphaltic emulsion delivered.

Within 1 business day of each job site delivery of asphaltic emulsion, submit to METS a 2-quart sample and a certificate of compliance. Ship each sample so that it is received at METS within 48 hours of sampling. Label each asphaltic emulsion sampling container with:

1. Emulsion producer and location
2. Asphaltic emulsion type
3. Percent of water
4. Sampling location and date
5. Contract number
6. Name of the Engineer

Each day that bonded wearing course is placed, submit the residual rate and the application rate for the asphaltic emulsion membrane.

During production, submit certified volume or weight slips for the materials supplied.

39-1.27A(4) Quality Control and Assurance

Testing must be performed by an AASHTO-accredited laboratory.

Do not test HMA-O for tensile strength ratio.

Sample HMA-O from either a truck or the material transfer device (MTV) hopper.

Perform sampling and testing for HMA-O in BWC-O at the specified frequency for the additional quality characteristic shown in the following table:

BWC-O Minimum Quality Control

Quality characteristic	Test method	Minimum sampling and testing frequency	Specification	Sampling location
Asphaltic emulsion membrane	Various	At least once per paving day	Specified in "Materials"	Delivery truck
	ASTM D 2995		Submitted target application rate ± 0.02 gal/sq yd	QC plan at the job site

The Engineer samples and tests HMA-O in BWC-O for acceptance for the additional quality characteristic shown in the following table:

BWC-O Acceptance

Quality characteristic	Test method	Specification	Sampling location
Asphaltic emulsion membrane	Various	Specified in "Materials"	Delivery truck
	ASTM D 2995	Submitted target residual rate ± 0.02 gal/sq yd	At the job site

Sample asphaltic emulsion under AASHTO T 40. For each job site delivery of asphaltic emulsion, take a 2-quart sample in the presence of the Engineer. Take samples from the delivery truck mid-load from a sampling tap or thief. If the sample is taken from the tap, draw and discard 4 quarts before sampling.

If you unload asphalt binder or asphaltic emulsion into bulk storage tanks, do not use material from the tanks until you submit test results for a sample taken from the bulk storage tank.

39-1.27B Materials

39-1.27B(1) General

Not Used

39-1.27B(2) Asphaltic Emulsion Membrane

Asphaltic emulsion membrane must have the properties shown in the following table:

Asphaltic Emulsion Membrane

Properties	Test method	Requirement	
		Min	Max
Saybolt Furol Viscosity, @ 25 °C, SFS ^a	AASHTO T59	20	100
Sieve test on original emulsion (at time of delivery) (%)		--	0.05
24-hour storage stability (%)		--	1
Residue by evaporation (%)	California Test 331	63	--
Tests on residue from evaporation test:			
Torsional recovery, measure entire arc of recovery, at 25 °C (%)	California Test 332	40	--
Penetration (0.01 mm) at 25 °C	AASHTO T49	70	150

^a SFS means Saybolt Furol seconds

39-1.27B(3) Asphalt Binder

Asphalt binder mixed with aggregate for HMA-O must be PG 64-10.

39-1.27B(4) Aggregate

Aggregate for HMA-O in BWC-O must comply with the 1/2-inch OGFC gradation.

Before the addition of asphalt binder and lime treatment, aggregate for HMA-O in BWC-O must have the quality characteristics shown in the following table:

Aggregate Quality		
Quality characteristic	Test method	Requirement
Percent of crushed particles	California Test 205	90
Coarse aggregate (% min)		
Two fractured faces		
Fine aggregate (% min) (Passing No. 4 sieve and retained on No. 8 sieve.)		
One fractured face		90
Los Angeles Rattler (% max)	California Test 211	12
Loss at 100 rev.		35
Loss at 500 rev.		
Sand equivalent ^a (min)	California Test 217	47
Fine aggregate angularity (% min)	California Test 234	45
Flat and elongated particles (% max by weight @ 3:1)	California Test 235	25

^a Reported value must be the average of 3 tests from a single sample.

39-1.27B(5) Reclaimed Asphalt Pavement

Do not use RAP in bonded wearing course.

39-1.27C Construction**39-1.27C(1) General**

Not Used

39-1.27C(2) Prepaving Conference

Attendance at the prepaving conference is mandatory for:

1. Emulsion supplier
2. Paving foreman
3. HMA-O supplier
4. Project superintendent
5. Project manager

39-1.27C(3) Mixing

Aggregate must not be more than 350 degrees F when mixed with asphalt binder. For continuous mixing, the completed mixture must not be more than 350 degrees F at the mixer discharge.

39-1.27C(4) Storing

Do not store HMA-O more than 4 hours.

39-1.27C(5) Spreading and Compacting Equipment

Use an integrated distributor-paver capable of spraying the asphaltic emulsion membrane, spreading the HMA-O, and leveling the mat surface in 1 pass.

Apply the asphaltic emulsion membrane at a uniform rate for the full paving width. The asphaltic emulsion membrane must not be touched by any part of the paver including wheels or tracks.

If the spray bar is adjusted for changing pavement widths, the paver must prevent excess spraying of asphaltic emulsion beyond 2 inches of the HMA-O edge.

The paver must have a receiving hopper or feed system.

Use an MTV to receive HMA-O directly from the truck without dumping on the ground and deliver to the paver's receiving hopper or feed system. The MTV must:

1. Remix the HMA-O with augers before loading the paver
2. Have sufficient capacity to prevent stopping the paver

The paver must have a full-width, heated vibratory screed that uniformly spreads and finishes the HMA-O.

Compact HMA-O with steel drum tandem rollers. Each roller must weigh from 126 to 172 pounds per linear inch of drum width.

39-1.27C(6) Transporting, Spreading, and Compacting

Apply the asphaltic emulsion membrane on dry or damp pavement with no free water. Apply asphaltic emulsion when the atmospheric and pavement temperatures are above 50 degrees F.

Before spreading HMA-O, apply the asphaltic emulsion membrane. Apply emulsion at a temperature from 120 to 180 degrees F and in a single application at the residual rate specified for the condition of the underlying surface. Choose a target residual rate corresponding to the surface conditions to receive the emulsion shown in the following table:

Asphaltic Emulsion Membrane Target Residual Rates	
Surface to receive asphaltic emulsion membrane	Target residual rates (gal/sq yd)
PCC pavement	0.09 – 0.11
Dense, compacted, new HMA pavement	0.11 – 0.14
Open textured, dry, aged or oxidized AC pavement	0.13 – 0.17

If you request and if authorized, you may change asphaltic emulsion membrane application rates.

Spread HMA-O after applying the asphaltic emulsion membrane and before the asphaltic emulsion membrane has spread beyond the area to be covered by the HMA-O. Do not apply the asphaltic emulsion membrane more than once.

Construct a transverse joint if HMA-O remains in the paver for more than 30 minutes.

Do not reintroduce HMA-O spread over the asphaltic emulsion membrane into the paving process.

Do not overlap or hot lap HMA-O. Pave through lanes after paving adjacent:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets
10. Ramps

For BWC-O placed on areas adjacent to through lanes that extend into the through lanes, cut the BWC-O to a neat vertical line at the lane line.

If you spill asphaltic emulsion into the paver hopper, stop paving and remove and dispose of the contaminated material.

When measured on the surface immediately behind the screed, the BWC-O must be at least 280 degrees F and the temperature across the mat should not vary by more than 25 degrees F. Do not take the temperature within 2 feet of the edge of the pavement. For each paver used, compact BWC-O with 2 coverages using 2 rollers with the vibrators turned off. Complete the 1st coverage before the surface temperature drops below 230 degrees F. Complete all compaction before the surface temperature drops below 180 degrees F.

If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the MTV. You may omit tarpaulins if the time from discharge to a truck until transfer to the MTV is less than 30 minutes.

Do not allow traffic on BWC-O until the surface temperature is below 160 degrees F.

39-1.27C(7) Smoothness

BWC-O must comply with the requirements for HMA smoothness in section 39-1.12.

39-1.27D Payment

BWC-O is measured as specified for HMA-O. Asphaltic emulsion membrane for BWC-O is measured as specified for asphaltic emulsion.

Replace section 39-1.30 with:

39-1.30 EDGE TREATMENT, HOT MIX ASPHALT PAVEMENT

39-1.30A General

Section 39-1.30 includes specifications for constructing the edges of HMA pavement as shown.

39-1.30B Materials

For the safety edge, use the same type of HMA used for the adjacent lane or shoulder.

39-1.30C Construction

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

For safety edge treatment, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the safety edge treatment can be placed either with each lift or with the final lift.

Short sections of hand work are allowed to construct transitions for safety edge treatment.

For more information on the safety edge treatment, go to:

http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge/

You can find a list of commercially available devices at the above Web site under "Frequently Asked Questions" and "Construction Questions."

39-1.30D Payment

Not Used

Add to section 39-6.01:

The bid item for place hot mix asphalt (miscellaneous area) is limited to the areas shown and is in addition to the bid items for the materials involved.

Payment for tack coat for miscellaneous areas is included in payment for the hot mix asphalt used in miscellaneous areas.

AA

40 CONCRETE PAVEMENT

Replace section 40-1.01C(13) with:

40-1.01C(13) Profile Data

At least 5 business days before start of initial profiling or changing profiler or operator, submit:

1. Inertial profiler (IP) certification issued by the Texas Transportation Institute (TTI). The certification must not be more than 12 months old.
2. Operator certification for the IP issued by TTI. The certification must not be more than 36 months old.
3. List of manufacturer's recommended test procedures for IP calibration and verification.

Within 2 business days after cross correlation testing, submit ProVAL profiler certification analysis report for cross correlation test results performed on test section. ProVal is FHWA's software. Submit the certification analysis report to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days after each day of inertial profiling, submit profile data to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Profiling data must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the international roughness index (IRI) of left and right wheel paths of each lane. Submit in PDF file format.
3. ProVAL ride quality analysis report for the mean roughness index (MRI) of each lane. Submit in PDF file format.
4. ProVAL smoothness assurance analysis report for IRIs of left wheel path. Submit in PDF file format.
5. ProVAL smoothness assurance analysis report for IRIs of right wheel path. Submit in PDF file format.
6. GPS data file for each lane in GPS exchange. Submit in GPS eXchange file format.
7. Manufacturer's recommended IP calibration and verification tests results.
8. AASHTO IP calibration and verification test results including bounce, block, and distance measurement instrument (DMI).

Submit the raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD_TTCCRRR_D_L_W_S_X_PT.PPF

where:

YYYY = year

MM = Month, leading zero

DD = Day of month, leading zero

TT = District, leading zero

CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08

RRR = Route number, no leading zeros

D = Traffic direction as NB, SB, WB, or EB

L = Lane number from left to right in direction of travel

W = Wheel path as "L" for left, "R" for right, or "B" for both

S = Beginning station to the nearest foot (i.e., 10+20) or beginning post mile to the nearest hundredth (i.e., 25.06) no leading zero

X = Profile operation as "EXIST" for existing pavement, "PAVE" for after paving, or "CORR" for after final surface pavement correction
PT = Pavement type (i.e., "concrete", etc.)

Electronic PPF files that do not follow this standardized naming convention will be rejected.

Within 2 business days of performing straightedge measurements, submit areas requiring smoothness correction. Identify locations of smoothness correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
 - 4.1. Lane direction as NB, SB, EB, or WB
 - 4.2. Lane number from left to right in direction of travel
 - 4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
 - 5.1. Identify pavement area (i.e., shoulder, weight station, turnout)
 - 5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area

Replace section 40-1.01C(14) with:

40-1.01C(14) Coefficient of Thermal Expansion

Fabricate test specimens from a single sample of concrete for coefficient of thermal expansion testing under AASHTO T 336. Submit 4 test specimens for assurance testing. Submit your test data at:

<http://169.237.179.13/cte/>

Replace "Reserved" in section 40-1.01D(1) with:

Provide a QC manager under section 11.

Your personnel required to attend the prepaving conference must also complete Just-In-Time-Training (JITT) for JPCP.

At least 5 business days before JITT, submit:

1. Instructor's name and listed experience
2. JITT facility's location
3. One copy each of the following:
 - 3.1. Course syllabus
 - 3.2. Handouts
 - 3.3. Presentation materials

The Engineer provides training evaluation forms, and each attendee must complete them 5 business days after JITT, submit completed training evaluation forms to the Engineer and the electronic mailbox address:

Construction_Engineering_HQ@dot.ca.gov

JITT may be an extension of the prepaving conference and must be:

1. At least 4 hours long
2. Conducted at a mutually agreed place
3. Completed at least 20 days before you start paving activities
4. Conducted during normal working hours

Provide a JITT instructor who is experienced with the specified pavement construction methods, materials, and tests. The instructor must be neither your employee nor a Department field staff member. Upon JITT completion, the instructor must issue a certificate of completion to each participant.

The Engineer may waive training for personnel who have completed equivalent training within the 12 months preceding JITT. Submit certificates of completion for the equivalent training.

The Department reimburses you for 1/2 of the cost for providing the JITT. The Engineer determines the costs under section 9-1.04 except no markups are added. Costs include training materials; class site; and the JITT instructor's wages, including the instructor's travel, lodging, meals and presentation materials. The Department does not pay your costs for attending JITT.

Replace section 40-1.01D(7)a with:

40-1.01D(7)(a) Coefficient of Thermal Expansion Testing

Perform coefficient of thermal expansion testing under AASHTO T 336 at a frequency of 1 test for each 5,000 cu yd of paving but not less than 1 test for projects with less than 5,000 cu yd of concrete. This test is not used for acceptance.

For field qualification, perform coefficient of thermal expansion testing under AASHTO T 336.

Replace section 40-1.01D(7)b with:

40-1.01D(7)(b) Smoothness Testing

Determine IRIs using the ProVAL ride quality analysis with a 250 mm filter. While collecting the profile data to determine IRI, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface

Determine the MRI for 0.1-mile fixed sections. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surface must comply with the MRI specifications for a full section. Adjust the MRI for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness. Use the ProVal smoothness assurance with a continuous IRI for each wheel path, 25-foot interval, and 250 mm filter.

Replace the paragraphs in section 40-1.01D(9) including the RSS for section 40-1.01D(9) with:

Test pavement smoothness using an IP except use a 12-foot straightedge at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. Areas within 15 feet of manholes
3. Shoulders
4. Weigh-in-motion areas
5. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

For IP testing, wheel paths are 3 feet from and parallel to the edge of a lane. Left and right are relative to the direction of travel. The IRI is the pavement smoothness along a wheel path of a given lane. The MRI is the average of the IRI values for the left and right wheel path from the same lane.

IP equipment must display a current certification decal with expiration date.

Operate the IP according to the manufacturer's recommendations and AASHTO R57-10 at 1-inch recording intervals and a minimum 4 inch line laser sensor.

Notify the Engineer 2 business days before performing IP calibration and verification testing.

Conduct the following IP calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under AASHTO R57-10, section 5.3.2.3.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under AASHTO R57-10, section 5.3.2.3.2.
3. DMI test. Calibrate the accuracy of the testing procedure under AASHTO R56-10, section 8.4.
4. Manufacturer's recommended tests.

Conduct cross correlation IP verification test in the Engineer's presence before performing initial profiling. Verify cross correlation IP verification test at least annually. Conduct 5 repeat runs of the IP on an authorized test section. The test section must be on an existing asphalt concrete pavement surface 0.1 mile long. Calculate a cross correlation to determine the repeatability of your device under Section 8.3.1.2 of AASHTO R56-10 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross correlation must be a minimum of 0.92.

For each 0.1 mile section, your IRI values must be within 10 percent of the Department's IRI values. The Engineer may order you to recalibrate your IP equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your IP operator.

Notify the Engineer of start location by station and start time at least 2 business days before profiling.

Before testing the pavement smoothness, remove foreign objects from the surface, and mark the beginning and ending station on the pavement shoulder.

Replace the 2nd paragraph of the RSS for section 40-1.01D(13)(a) with:

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

Replace the paragraphs in section 40-1.01D(13)(d) including the RSS for section 40-1.01D(13)(d) with: Where testing with an IP is required, the pavement surface must have:

1. No areas of localized roughness with an IRI greater than 120 in/mi
2. MRI of 60 in/mi or less within a 0.1 mile section

Where testing with a straightedge is required, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

Replace "Reserved" in section 40-1.02I(1) with:

Replace the 1st paragraph of the RSS for section 40-1.03E(6)(c) with:

Install preformed compression seal in isolation joints.

Replace the list for the 7th paragraph of section 40-1.03G with:

1. Pavement surface must not vary from the lower edge of a 12-ft straightedge by more than:
 - 1.1. 0.01 foot when the straightedge is laid parallel with the centerline
 - 1.2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
 - 1.3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform
2. Dowel bars do not comply with specified placement tolerances
3. Concrete pavement thickness deficiency is greater than 0.05 foot
4. Final finishing does not comply with the specifications except coefficient of friction

Add after the 9th paragraph of section 40-1.03G:

Retest the test strip smoothness under section 40-1.01D(9).

Replace "Reserved" in section 40-1.03L(1) of the RSS for section 40-1.03L with:

Construct edge treatments as shown. Regrade when required for the preparation of safety edge areas.

Sections 40-1.03L(2) and 40-1.03L(3) do not apply to safety edges.

For safety edges placed after the concrete pavement is complete, concrete may comply with the requirements for minor concrete.

For safety edges placed after the concrete pavement is complete, install connecting bar reinforcement under section 52.

Saw cutting or grinding may be used to construct safety edges.

For safety edges, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

Replace the 2nd and 3rd paragraphs of section 40-1.03Q(5) with:

Do not start corrective work until:

1. Pavement has cured 10 days
2. Pavement has at least a 550 psi modulus of rupture
3. Your corrective method is authorized

Correct the entire lane width and begin and end grinding at lines perpendicular to the roadway centerline. The corrected area must have a uniform texture and appearance.

Add after the 4th paragraph of section 40-1.03Q(5):

If corrections are made within areas where testing with an IP is required, retest the entire lane length with an IP under section 40-1.01D(9).

If corrections are made within areas where testing with a 12-foot straightedge is required, retest the corrected area with a straightedge under section 40-1.01D(9).

Replace "Reserved" in section 40-2 with:

40-2 JOINTED PLAIN CONCRETE PAVEMENT

40-2.01 GENERAL

40-2.01A Summary

Section 40-2 includes specifications for constructing JPCP.

40-2.01B Submittals

40-2.01B(1) General

Not Used

40-2.01B(2) Early Age Crack Mitigation System

At least 24 hours before each paving shift, submit the following information as an informational submittal:

1. Early age stress and strength predictions
2. Scheduled sawing and curing activities
3. Contingency plan for mitigating cracking

40-2.01C Quality Control and Assurance

40-2.01C(1) General

Not Used

40-2.01C(2) Quality Control Plan

The QC plan must include a procedure for identifying transverse contraction joint locations relative to the dowel bars longitudinal center and a procedure for consolidating concrete around the dowel bars.

40-2.01C(3) Early Age Crack Mitigation System

For PCC concrete pavement, develop and implement a system for predicting stresses and strength during the initial 72 hours after paving. The system must include:

1. Subscription to a weather service to obtain forecasts for wind speed, ambient temperatures, humidity, and cloud cover
2. Portable weather station with an anemometer, temperature and humidity sensors, located at the paving site
3. Early age concrete pavement stress and strength prediction computer program
4. Analyzing, monitoring, updating, and reporting the system's predictions

40-2.02 MATERIALS

Not Used

40-2.03 CONSTRUCTION

40-2.03A General

Transverse contraction joints on a curve must be on a single straight line through the curve's radius point.

40-2.03B Tie Bar Placement

If the curvature of a concrete pavement slab prevents equal spacing of tie bars to maintain the minimum clearance from transverse joints, space them from 15 to 18 inches.

40-2.03C Ramp Termini

For ramp termini, use heavy brooming normal to the ramp centerline to produce a coefficient of friction of at least 0.35 determined on the hardened surface under California Test 342.

40-2.03D Removal and Replacement

When replacing concrete, saw cut and remove to full depth and width.

Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and where the Engineer orders. You may make additional saw cuts within the removal area to facilitate slab removal or to prevent binding of the saw cut at the removal area's edge. Saw cut perpendicular to the slab surface.

Use slab lifting equipment with lifting devices that attach to the slab. After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete using dowel bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bar holes from the original dowel bar by 3 inches.

Drill holes and use chemical adhesive to bond the dowel bars to the existing concrete. Use an automated dowel bar drilling machine. Holes must be at least 1/8-inch greater than the dowel bar diameter. Clean the holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry when you place chemical adhesive.

Maintain the stability of the existing abutment 1 of Via California OC (Br. No. 55-0225), and construct the ground anchor wall in segment (slot cuts) with each segment completed (vertical excavation followed by ground anchor construction and shotcrete facing) prior to excavating another segment (slot cut). For each segment (slot cut) the maximum horizontal length of any vertical excavation for ground anchor installation at any given time, must be limited to one-fifth of the existing abutment footing length or not more than 12 feet in length measured along the wall layout line.

Implement a monitoring program for the construction of the ground anchor wall to monitor the settlements and movements of the existing bridge abutment. If the measured vertical or lateral movement of the abutment is over one-quarter of an inch (1/4"), construction of the ground anchor wall must be stopped immediately and measures to mitigate the movement must be implemented before construction can resume.

46-2.03A(1) Monitoring Program

Perform settlement and movement monitoring consisting of measurements and plotting of settlements and movements of the temporary surface monuments, which elevation and position are pre-determined. A minimum of total 4 temporary surface monuments must be placed at the bridge abutment back wall and on the approach roadway surface no more than 3 feet from the bridge abutment expansion joint of Via California OC (Br. No. 55-0225). The exact locations must be reviewed and approved.

Temporary surface monuments for settlement and movement monitoring must be installed prior to the excavation for ground anchor wall construction. Monitoring must commence when excavating for ground anchor wall begins, and continue in accordance with the following schedule:

1. Initial Reading: Prior to excavation for the ground anchor wall
2. During Ground Anchor Wall Construction: Every working day
3. First Month after Completion of Ground Anchor Wall: Once per week
4. Thereafter: Once per two weeks until the completion of the entire length of retaining wall construction (consisting of ground anchor wall and soil nail wall)

Submit settlement and movement measurements and plots for review at the end of each working day during ground anchor wall construction. Collect and plot settlement and movement monitoring data as directed by the Engineer. Plot data as settlement and movement (accurate to 1/16 of an inch) versus time (in day).

Remove the temporary surface monuments and restore the areas to its original condition after construction of the entire wall is completed.

Add to the 2nd paragraph of section 46-3.01D(2)(b)(iii):

In addition to the proof test soil nails shown, install and test 20 proof test soil nails at locations determined by the Engineer.

Replace the 1st paragraph of section 46-3.02A with:

Each production soil nail must be a reinforcing bar encapsulated full length in a grouted corrugated plastic sheathing.

Add to section 46-3.03A:

Expect difficult soil nail installation at RW No. 349 (Br. No. 55E0134) due to the presence of the following conditions:

1. Dense and hard soil layers
2. Localized granular soil layers with caving potential
3. Localized wet soils
4. Above and below the bedrock contact at all locations

Care must be taken to avoid caving of the drill hole. Soil that may have sloughed into the holes must be removed prior to installation of the nails. Nails that are driven or pushed beyond the drill hole length or cut off will not be allowed.

AA

48 TEMPORARY STRUCTURES

Add to section 48-2.01C(2):

The review time for shop drawings for specific structures or portions of structures is shown in the following table:

Structure or portion of structure	Total review time
Br. No. 55-0226, SB widening	30 days
Br. No. 55-0510, SB widening	30 days

AA

49 PILING

Add to section 49-1.03:

Expect difficult pile installation due to the conditions shown in the following table:

Pile location		Conditions
Bridge no.	Support location	
55-0226	Abuts and Bents	Presence of localized dense hard soil layers above and below the bedrock contact, caving soils, high ground water
55-0227	Abuts and Bents	Presence of localized dense hard soil layers above and below the bedrock contact, caving soils, high ground water
55-0510	Abuts and Bents	Presence of localized dense hard soil layers above and below the bedrock contact, caving soils, high ground water
55E0135	RW 387	Deflection of the adjacent exist MSE wall during pile driving operation must be closely monitored

Replace section 49-2.01C(3) with:

49-2.01C(3) Drilling

Do not use drilling to attain the specified tip elevation shown for driven piles.

Add to section 49-2.01C(4):

Drive piles in predrilled holes at the locations and to the bottom of hole elevations shown in the following table:

Bridge name or number	Abutment no.	Bent no	Bottom of hole elevation
55-0227L	1	N/A	80
55-0227L	5	N/A	85

Add to section 49-2.01C(5):

Piles at Br. No. 55-0227L and RW 387 (Br. No. 55E0135) that do not attain the nominal driving resistance at the specified tip elevation shown may be allowed to stand for a "set period" without driving. The "set period" must be at least 12 hours.

After the "set period" has elapsed, redrive 2 piles or 10 percent of the piles in the footing, whichever is greater. The Engineer designates which piles are to be redriven. Redriving consists of operating the driving hammer at full rated energy on the pile and calculating the nominal driving resistance of the pile.

If the nominal driving resistance is attained for each pile designated to be redriven, the remaining piles in that footing are considered satisfactory and further driving will not be required. If redriving the designated piles demonstrates that the nominal driving resistance has not been attained, redrive all piles in the footing until the nominal driving resistance is attained.

Add to section 49-2.04B(1):

Alternative "X" type piles must have a dimension, T, of at least 14 inches at the abutments of Br. No. 55-0227 and at RW 387.

Replace "Reserved" in section 49-3.02A(4)(b) with:

Schedule and hold a preconstruction meeting for CIDH concrete pile construction (1) at least 5 business days after submitting the pile installation plan and (2) at least 10 days before the start of CIDH concrete pile construction. You must provide a facility for the meeting.

The meeting must include the Engineer, your representatives, and any subcontractors involved in CIDH concrete pile construction.

The purpose of this meeting is to:

1. Establish contacts and communication protocol between you and your representatives, any subcontractors, and the Engineer
2. Review the construction process, acceptance testing, and anomaly mitigation of CIDH concrete piles

The Engineer will conduct the meeting. Be prepared to discuss the following:

1. Pile placement plan, dry and wet
2. Acceptance testing, including gamma-gamma logging, cross-hole sonic logging, and coring
3. *Pile Design Data Form*
4. Mitigation process
5. Timeline and critical path activities
6. Structural, geotechnical, and corrosion design requirements
7. Future meetings, if necessary, for pile mitigation and pile mitigation plan review
8. Safety requirements, including Cal/OSHA and Tunnel Safety Orders

Add to section 49-3.02B(6)(c):

The synthetic slurry must be one of the materials shown in the following table:

Material	Manufacturer
SlurryPro CDP	KB INTERNATIONAL LLC 735 BOARD ST STE 209 CHATTANOOGA TN 37402 (423) 266-6964
Super Mud	PDS CO INC 105 W SHARP ST EL DORADO AR 71731 (870) 863-5707
Shore Pac GCV	CETCO CONSTRUCTION DRILLING PRODUCTS 2870 FORBS AVE HOFFMAN ESTATES IL 60192 (800) 527-9948
Terragel or Novagel Polymer	GEO-TECH SERVICES LLC 220 N. ZAPATA HWY STE 11A-449A LAREDO TX 78043 (210) 259-6386

Use synthetic slurries in compliance with the manufacturer's instructions. Synthetic slurries shown in the above table may not be appropriate for a given job site.

Synthetic slurries must comply with the Department's requirements for synthetic slurries to be included in the above table. The requirements are available from the Offices of Structure Design, P.O. Box 168041, MS# 9-4/11G, Sacramento, CA 95816-8041.

SlurryPro CDP synthetic slurry must comply with the requirements shown in the following table:

SLURRYPRO CDP

Property	Test	Value
Density During drilling	Mud Weight (density), API 13B-1, section 1	$\leq 67.0 \text{ pcf}^a$
Before final cleaning and immediately before placing concrete		$\leq 64.0 \text{ pcf}^a$
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	50–120 sec/qt
Before final cleaning and immediately before placing concrete		$\leq 70 \text{ sec/qt}$
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete	Sand, API 13B-1, section 5	$\leq 0.5 \text{ percent}$

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

Super Mud synthetic slurry must comply with the requirements shown in the following table:

SUPER MUD

Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	$\leq 64.0 \text{ pcf}^a$
Before final cleaning and immediately before placing concrete		$\leq 64.0 \text{ pcf}^a$
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	32–60 sec/qt
Before final cleaning and immediately before placing concrete		$\leq 60 \text{ sec/qt}$
pH	Glass electrode pH meter or pH paper	8.0–10.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete	Sand, API 13B-1, section 5	$\leq 0.5 \text{ percent}$

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

Shore Pac GCV synthetic slurry must comply with the requirements shown in the following table:

SHORE PAC GCV

Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	$\leq 64.0 \text{ pcf}^a$
Before final cleaning and immediately before placing concrete		$\leq 64.0 \text{ pcf}^a$
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	33–74 sec/qt
Before final cleaning and immediately before placing concrete		$\leq 57 \text{ sec/qt}$
pH	Glass electrode pH meter or pH paper	8.0–11.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete	Sand, API 13B-1, section 5	$\leq 0.5 \text{ percent}$

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

Terragel or Novagel Polymer synthetic slurry must comply with the requirements shown in the following table:

TERRAGEL OR NOVAGEL POLYMER		
Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	$\leq 67.0 \text{ pcf}^a$
Before final cleaning and immediately before placing concrete		$\leq 64.0 \text{ pcf}^a$
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	45–104 sec/qt
Before final cleaning and immediately before placing concrete		$\leq 104 \text{ sec/qt}$
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete	Sand, API 13B-1, section 5	$\leq 0.5 \text{ percent}$

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

Add to section 49-3.02C(1):

If the piling center-to-center spacing is less than 3 pile diameters, do not drill holes or drive casing for an adjacent pile until 24 hours have elapsed after concrete placement in the preceding pile and your prequalification test results for the concrete mix design show that the concrete will attain at least 1800 psi compressive strength at the time of drilling or driving.

AA

50 PRESTRESSING CONCRETE

Add to section 50-1.01A:

The details shown for CIP PS box girder bridges are based on a bonded full length draped tendon prestressing system. For these bridges, you may submit a VECP for an alternative prestressing system using bonded partial length tendons if the proposed system and associated details comply with the following requirements:

1. The proposed system and details must provide moment and shear resistances at least equal to those used for the design of the structure shown.
2. The concrete strength must be at least that shown.
3. Not less than 50 percent of the total prestressing force at any section must be provided by full length draped tendons.
4. Anchorage blocks for partial length tendons must be located such that the blocks will not interfere with the placement of the utility facilities shown or of any future utilities to be placed through openings shown.
5. Temporary prestressing tendons, if used, must be detensioned, and the temporary ducts must be filled with grout before completion of the work. Temporary tendons must be either removed or fully encased in grout before completion of the work.

Upon your request, the Department furnishes you with the demand moments and shears used in the design shown.

Submit shop drawings of the proposed system, including all details and supporting checked calculations.

Replace the 2nd paragraph of section 50-1.01C(3) with:

For initial review, submit:

1. 8 sets for railroad bridges
2. 10 sets for railroad bridges if the project includes a BNSF Railway underpass
3. 6 sets for other structures

^^

51 CONCRETE STRUCTURES

Add to section 51-1.01A:

The concrete at Retaining Wall No.387 (Bridge No. 55E0135), as shown, must be integrally pigmented colored concrete. The color must match color no. 33446 of FED-STD-595.

Add to section 51-1.03G(1):

^^

52 REINFORCEMENT

Replace the 1st paragraph of section 52-5.01D(1) with:

Headed bar reinforcement must have reduced size heads and must be on the Authorized Material List.

^^

56 SIGNS

Add to section 56-3.02K(2):

Seal the perimeters of direct tension indicator gaps with caulking. Caulking must be gray and at least 50 mils thick. Apply caulking before painting.

Add to section 56-3.02M(3)(a):

Clean the inside surfaces of bolt holes under SSPC-SP 1. Any visible rust must be removed.

Paint the inside surfaces of bolt holes with 1 application of a zinc-rich primer (organic vehicle type) after the application of the undercoat of inorganic zinc on adjacent steel. Keep the steel surfaces adjacent to the bolt holes clean and protected from drippings during the application of the primer.

Grout used to fill sign posts and post pockets must comply with section 51-1.02G.

Immediately before placing a sign post in a post pocket:

- Place grout into the post pocket and insert the post. Retempering of the grout is not allowed. Cure the grout at least 3 days using the curing compound method or by keeping the surface continuously damp.

[illegible]

Replace the 2nd paragraph in section 65-2.02A with:

Use one of the options shown in the following table. You may use SCM.

Minimum Concrete Cover	Minimum cementitious material content based on maximum water to cementitious material ratio	
	0.35	0.40
1.00 inch	470 lb/cu yd	470 lb/cu yd

If you encounter solid rock or other unyielding material at the planned elevation of the bottom of the bedding shown, remove the material below the bottom of the bedding to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 6 inches or more than 12 inches. Backfill the resulting trench below the bottom of the bedding with structure backfill material under section 19-3.03E. Do not compact the outer bedding before pipe placement.

The excavation and backfill below the planned elevation of the bottom of the bedding shown is change order work.

[illegible]

Replace "Reserved" in section 83-1.02B(1) with:

Section 83-1.02B(1) includes specifications for constructing vegetation control areas around metal beam guard railing posts with minor concrete.

Submit mix design for the minor concrete to be used for vegetation control. Include compressive strength test results with your mix design.

Submit the quantity in pounds of crumb rubber with your certificate of compliance for crumb rubber aggregate if used.

83-1.02B(1)(b) Materials

83-1.02B(1)(b)(i) General

Not Used

83-1.02B(1)(b)(ii) Minor Concrete

Minor concrete must include reinforcing fibers and may include crumb rubber aggregate.

Section 90-2.02B does not apply. Minor concrete must contain at least:

1. 505 pounds of cementitious material per cubic yard if crumb rubber aggregate is used
2. 400 pounds of cementitious material per cubic yard if crumb rubber aggregate is not used

The 3rd paragraph of section 90-2.02C does not apply. Minor concrete must have a maximum aggregate size of 3/8 inch.

You may use volumetric proportioning under ASTM C 685/C 685M or section 90-3.02B.

Minor concrete must have a 28-day compressive strength from 1,400 to 1,800 psi.

83-1.02B(1)(b)(iii) Crumb Rubber Aggregate

Crumb rubber must consist of ground or granulated scrap tire rubber from automobile and truck tires. Tire buffings are not allowed. Crumb rubber aggregate must be ground and granulated at ambient temperature.

The gradation of the crumb rubber aggregate must meet the requirements of the following table:

Gradation Requirements	
Sieve size	Percentage passing
1/2"	100
3/8"	90–100
1/4"	35–45
No. 4	5–15
No. 8	0–5
No. 16	0

Crumb rubber aggregate must not contain more than 0.01 percent of wire by mass of crumb rubber and must be free of oils and volatile organic compounds.

Comingling of crumb rubber from different sources is not allowed.

The crumb rubber aggregate must be 3.5 ± 0.5 percent by weight of the concrete.

83-1.02B(1)(b)(iv) Reinforcing Fibers

Reinforcing fibers for minor concrete must be:

1. Polypropylene fibers with an engineered sinusoidal contoured profile manufactured specifically for use as concrete reinforcement.
2. Blended ratio of 4 parts by weight of coarse monofilament fibers with maximum individual fiber lengths of $2 \pm 1/2$ inch and 1 part by weight of fine fibrillated polypropylene fibers of various lengths and thicknesses. If the coarse and fine reinforcing fibers are supplied by the same manufacturer, they may be premixed in a sealed 5-lb degradable bag.
3. From a commercial source.
4. Concrete ingredient as described in your mix design and as recommended by the manufacturer.

The reinforcing fiber content of minor concrete must be 5 lbs/cu yd.

83-1.02B(1)(b)(v) Coloring Agent

If a color for concrete is specified in section 83-1.02B(1)(b)(i), the coloring agent must be integral to the concrete mix and added at the concrete plant.

If the curing compound method is used, use curing compound no. 6.

83-1.02B(1)(b)(vi) Block-Out Material

Use a commercially available expanded polystyrene foam for the block-out material. The expanded polystyrene foam must have a compressive strength of 13 ± 5 psi at 10 percent deformation when tested under ASTM D1621.

You may substitute any appropriate material that meets the compressive strength requirements of the expanded polystyrene foam if authorized.

83-1.02B(1)(c) Construction**83-1.02B(1)(c)(i) General**

Areas to receive vegetation control must be cleared of vegetation, trash, and debris. Dispose of removed material.

83-1.02B(1)(c)(ii) Earthwork

Excavate areas to receive vegetation control. Where vegetation control abuts the existing surfacing, the edge of the existing surfacing must be on a neat line or must be cut on a neat line to a minimum depth of 2 inches before removing the surfacing. The finished elevation of the excavated area to receive vegetation control must maintain planned flow lines, slope gradients, and contours of the job site.

Grade areas to receive vegetation control to a smooth, uniform surface and compact to a relative compaction of not less than 95 percent.

Dispose of surplus excavated material uniformly along the adjacent roadway, except as specified in section 14-11.

83-1.02B(1)(c)(iii) Block Out

Install block-out material as shown.

If block-out material is supplied in more than 1 piece, tape the pieces together to make a smooth surface on the top and sides.

Ensure block-out material does not move during concrete placement.

83-1.02B(1)(c)(iv) Placing Minor Concrete

Place minor concrete for vegetation control by hand.

Strike off and compact minor concrete with a mechanical or vibratory screed device. Apply a broom finish. Match the finished grade to the adjacent section of vegetation control, pavement, shoulder, or existing grade.

83-1.02B(1)(d) Payment

Vegetation control (minor concrete) is measured from the actual areas placed. The Department does not pay for vegetation control (minor concrete) placed outside the dimensions shown.

Replace section 83-1.02C(3) with:**83-1.02C(3) Alternative Flared Terminal System**

Alternative flared terminal system must be furnished and installed as shown on the plans and under these special provisions.

The allowable alternatives for a flared terminal system must consist of one of the following or a Department-authorized equal.

1. TYPE FLEAT TERMINAL SYSTEM - Type FLEAT terminal system must be a Flared Energy Absorbing Terminal 350 manufactured by Road Systems, Inc., located in Big Spring, Texas, and must

include items detailed for Type FLEAT terminal system shown on the plans. The Flared Energy Absorbing Terminal 350 can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, telephone (801) 785-0505 or from the distributor, Gregory Industries, Inc., 4100 13th Street, S.W., Canton, OH 44708, telephone (330) 477-4800.

2. TYPE SRT TERMINAL SYSTEM - Type SRT terminal system must be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type SRT terminal system shown on the plans. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

Submit a certificate of compliance for terminal systems.

Terminal systems must be installed under the manufacturer's installation instructions and these specifications. Each terminal system installed must be identified by painting the type of terminal system in neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

For Type SRT terminal system, the steel foundation tubes with soil plates attached must be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. The wood terminal posts must be inserted into the steel foundation tubes by hand and must not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For Type FLEAT terminal system, the soil tubes must be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. Wood posts must be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

After installing the terminal system, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

Replace the 14th paragraph of section 83-1.02I with:

Chain link fabric must be 9 gage and comply with AASHTO M 181 for Type IV fabric with a Class B coating.

The bond strength between the coating material and steel of the bonded vinyl-coated chain link fabric must be equal to or greater than the cohesive strength of the PVC coating material.

Add to section 83-2.02D(1):

Where shown, construct concrete barriers on a layer of Class 2 aggregate base. Aggregate base must comply with section 26. Adjust the height of the barriers to allow for irregularities in the surface of the finished aggregate base. The adjustment amount will be ordered before the concrete is placed.

Replace the 11th paragraph of section 83-2.02D(1) with:

Cement concrete barrier markers to the barrier under the manufacturer's instruction. Barrier markers to be placed as shown on the plans.

Replace section 83-2.02E(4) with:

83-2.02E(4) Type REACT Crash Cushion

Type REACT crash cushion must be installed where shown.

Type REACT crash cushion and additional components must comply with the descriptions shown in the following table:

Bid item description	Manufacturer's product description
Type REACT 9CBB crash cushion	REACT 350-36 concrete side mount

The successful bidder can obtain from the following distributors the Type REACT crash cushion manufactured by Energy Absorption Systems, Inc. at 35 East Wacker Drive, Suite 1100, Chicago, IL 60601-2076:

1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (916) 387-9733, FAX (916) 387-9734
2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (714) 526-9500, FAX (714) 526-9561

The price quoted by the manufacturer for Type REACT 9CBB crash cushion, FOB Pell City, Alabama is \$32000, not including sales tax.

The above prices will be firm for orders placed within 30 days of Contract award, and provided delivery is accepted within 90 days after the order is placed.

The price quoted for Type REACT 9CBB crash cushion includes the concrete anchorage devices, but does not include the concrete anchor slab or the concrete backup block.

Install the crash cushion under the manufacturer's instructions.

Concrete anchorage devices used for attaching the crash cushion to the base slab must be limited to those that have been provided by the manufacturer.

The concrete anchor slab and backup block must comply with sections 51 and 52.

The concrete anchor slab and backup block must be constructed of concrete containing not less than 590 pounds of cementitious material per cubic yard.

Submit a copy of the manufacturer's plan and parts list, for each model installed, as an informational submittal.

Submit a certificate of compliance for each model of Type REACT crash cushion.

Payment for structure excavation, structure backfill, and concrete anchor slab and backup block with bar reinforcing steel is included in the payment for crash cushion (REACT 9CBB).

Replace section 83-2.02E(5) with:

83-2.02E(5) Sand-Filled Crash Cushion

Sand-filled crash cushions must be installed where shown.

A sand-filled crash cushion must consist of an array of sand-filled modules.

Crash cushions must be installed at the following locations:

103' Lt "A" 361+00.

Modules for use in sand-filled crash cushions must be either of the following, manufactured after March 31, 1997, or equal:

1. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., 35 East Wacker Drive, Suite 1100, Chicago, IL 60601-2076:

- 1.1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (916) 387-9733, FAX (916) 387-9734
- 1.2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (714) 526-9500, FAX (714) 526-9561
2. Traffix Sand Barrels, manufactured by Traffix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672, telephone (949) 361-5663, FAX (949) 361-9205:
 - 2.1. Northern California: United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112, telephone (408) 287-4303, FAX (408) 287-1929
 - 2.2. Southern California: Statewide Safety & Sign, P.O. Box 1440, Pismo Beach, CA 93448, telephone (805) 929-5070, FAX (805) 929-5786
3. CrashGard Model CC-48 Sand Barrels, manufactured by Plastic Safety Systems, Inc., 2444 Baldwin Road, Cleveland, OH 44104:
 - 3.1. Northern California:
 - 3.1.1. Capitol Barricade Inc., 6329 Elvas Avenue, Sacramento, CA 95819, telephone (916) 451-5176, FAX (916) 451-5388
 - 3.1.2. Capitol Barricade Inc., 1661 East Miner Avenue, Stockton, CA 95205, telephone (209) 469-2663, FAX (916) 451-5388
 - 3.1.3. Sierra Safety, 9093 Old State Highway, Newcastle, CA 95658, telephone (916) 663-2026, FAX (916) 663-1858
 - 3.1.4. Alert O Lite, 2020 N Winery Road, Fresno, CA 93703, telephone (559) 486-4570
 - 3.1.5. Stevenson Supply, 3601 Regional Parkway, Santa Rosa, CA 95403, telephone (707) 575-3335
 - 3.2. Southern California: Hi Way Safety Inc., 13310 5th Street, Chino, CA 91710, telephone (909) 591-1781, FAX (909) 627-0999

Modules contained in the crash cushion must be of the same type at each location. The color of the modules must be the standard yellow color as furnished by the vendor, with black lids. The exterior components of the modules must be formulated or processed to resist deterioration from ambient ultraviolet rays. The modules must exhibit good workmanship free from structural flaws and objectionable surface defects.

Submit a certificate of compliance for sand-filled crash cushion.

Sand for filling the modules must be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand must contain not more than 7 percent water when tested under California Test 226.

Modules placed on bridge decks must be provided with positioning blocks fastened to the deck surface. Positioning blocks must be shaped as segments of a ring and placed along the inner or outer periphery of the module wall. A minimum of 2 blocks, a minimum of one-sixth of a ring in length must be provided for each module. Positioning blocks and fasteners must be of a material that is corrosion and water resistant.

Module cylinders must be filled with sand under the manufacturer's instructions and to the sand capacity in pounds for each module shown.

Lids must be securely attached under the manufacturer's instructions.

A Type R or Type P marker panel must be attached to the front of the crash cushion as shown, if the closest point of the crash cushion array is within 12 feet of the traveled way. The marker panel, if required, must be firmly fastened to the crash cushion with commercial quality hardware or by other authorized methods.

Crash cushion, sand filled is measured from actual count of the units in place, regardless of the number of modules required in each unit.

Add to section 83-2.03:

Concrete barrier (Type 736S) is paid for as concrete barrier (Type 736SV).

Concrete barrier (Type 736S Mod) is paid for as concrete barrier (Type 736SV).

AA

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

Replace the 2nd paragraph in section 84-2.03B with:

Apply thermoplastic for traffic stripes by the ribbon extrusion method in a single pass. Apply the thermoplastic at a rate of at least 0.27 lb/ft of 4-inch-wide solid stripe. The applied thermoplastic must be at least 0.080 inch thick.

AA

86 ELECTRICAL SYSTEMS

Add to the end of the 1st paragraph of section 86-1.01:

This work is shown on sheets labeled *E*. The work involved in each section 86 bid item is shown on a sheet with a sheet title matching the bid item description except for the following bid items:

1. Maintaining existing traffic management system elements during construction
2. System testing and documentation

Add to section 86-1.01:

Lighting equipment is included in the following structures:

1. Bridge No. 55-0225
2. Bridge No. 55-0226

Communication conduit is included in the following structures:

1. Bridge No. 55-0226

Traffic signal work must be performed at the following locations:

1. Pacific Coast Hwy & I-5 SB Off-Ramp
2. Camino Las Ramblas/I-5 NB Off-Ramp

Add to section 86-1.03:

Submit a schedule of values within 15 days after Contract approval.

Add to the 4th paragraph of section 86-1.03:

13. Materials shown in the quantity tables on sheets labeled *E-107* through *E-113*
14. Tracer wire

Replace the 3rd paragraph of section 86-1.06A with:

Traffic signal system shutdowns are limited to periods between the hours of 9:00 a.m. and 3:00 p.m.

Replace "Reserved" in section 86-1.06B with:

Traffic Management System (TMS) elements include, but are not limited to ramp metering (RM) system, communication system, traffic monitoring stations, video image vehicle detection system (VIVDS), microwave vehicle detection system (MVDS), loop detection system, changeable message sign (CMS) system, extinguishable message sign (EMS) system, highway advisory radio (HAR) system, closed circuit television (CCTV) camera system, roadway weather information system (RWIS), visibility sensor, and fiber optic system.

Existing TMS elements, including detection systems, shown and located within the project limits must remain in place and be protected from damage. If the construction activities require existing TMS elements to be nonoperational or off line, and if temporary or portable TMS elements are not shown, the Contractor must provide for temporary or portable TMS elements. The Contractor must receive authorization on the type of temporary or portable TMS elements and installation method.

Before work is performed, the Engineer, the Contractor, and the Department's Traffic Operations Electrical representatives must jointly conduct a pre-construction operational status check of all existing TMS elements and each element's communication status with the Traffic Management Center (TMC), including existing TMS elements not shown and elements that may not be impacted by the Contractor's activities. The Department's Traffic Operations Electrical representatives will certify the TMS elements' location and status, and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components.

The Contractor must obtain authorization at least 72 hours before interrupting existing TMS elements' communication with the TMC that will result in the elements being nonoperational or off line. The Contractor must notify the Engineer at least 72 hours before starting excavation activities.

Traffic monitoring stations and their associated communication systems, which were verified to be operational during the pre-construction operational status check, must remain operational on freeway/highway mainline at all times, except:

1. For a duration of up to 15 days on any continuous segment of the freeway/highway longer than 3 miles
2. For a duration of up to 60 days on any continuous segment of the freeway/highway shorter than 3 miles

If the construction activities require existing detection systems to be nonoperational or off line for a longer time period or the spacing between traffic monitoring stations is more than the specified criteria above, and temporary or portable detection operations are not shown, the Contractor must provide provisions for temporary or portable detection operations. The Contractor must receive authorization on the type of detection and installation before installing the temporary or portable detection.

If existing TMS elements shown or identified during the pre-construction operational status check, except traffic monitoring stations, are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer must be notified immediately. If the Contractor is notified by the Engineer that existing TMS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed TMS elements, excluding structure-related elements, must be repaired or replaced, at the Contractor's expense, within 24 hours. For a structure-related elements, the Contractor must install temporary or portable TMS elements within 24 hours. For nonstructure-related TMS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.

If fiber optic cables are damaged due to the Contractor's activities, the Contractor must install new fiber optic cables from an original splice point or termination to an original splice point or termination, unless otherwise authorized. Fiber optic cable must be spliced at the splice vaults if available. The amount of new fiber optic cable slack in splice vaults and the number of new fiber optic cable splices must be equivalent to the amount of slack and number of splices existing before the damage or as directed by the Engineer. Fusion splicing will be required.

The Contractor must demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment. If the Contractor fails to perform required repairs or replacement work, the Department may perform the repair or replacement work and the cost will be deducted from monies due to the Contractor.

A TMS element must be considered nonoperational or off line for the duration of time that active communications with the TMC is disrupted, resulting in messages and commands not transmitted from or to the TMS element.

The Contractor must provide provisions for replacing existing TMS elements within the project limits, including detection systems, that were not identified on the plans or during the pre-construction operational status check that became damaged due to the Contractor's activities.

If the pre-construction operational status check identified existing TMS elements, then the Contractor, the Engineer, and the Department's Traffic Operations Electrical representatives must jointly conduct a post construction operational status check of all existing TMS elements and each element's communication status with the TMC. The Department's Traffic Operations Electrical representatives will certify the TMS elements' status and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components. TMS elements that cease to be functional between pre and post construction status checks must be repaired at the Contractor's expense.

The Engineer will authorize the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements must be new and of equal or better quality than the existing TMS elements.

If no electrical work exists on the project and no TMS elements are identified within the project limits, the pre-construction operational status check is change order work.

Furnishing and installing temporary or portable TMS elements that are not shown, but are required when an existing TMS element becomes nonoperational or off line due to construction activities, is change order work.

Furnishing and installing temporary or portable TMS elements and replacing TMS elements that are not shown nor identified during the pre-construction operational status check and were damaged by construction activities is change order work.

If the Contractor is required to submit provisions for the replacement of TMS elements that were not identified, submitting the provisions is change order work.

Add to Section 86-1.06:

86-1.06C Ramp Metering System (Stage Construction)

86-1.06C(1) General 86-1.06C(1)(a) Summary

Section 86-1.06C includes specifications for ramp metering system (stage construction).

86-1.06C(1)(b) Definitions

Not Used.

86-1.06C(1)(c) Submittals

86-1.06C(1)(c)i Photovoltaic Power Supply

Engineering and design drawings for the installation, and performance of the Photovoltaic panel

Submittals for the PV power supply for MVDS shall conform to the provisions in Section 86-1.04, "Equipment List and Drawings," of the Standard Specifications and these special provisions. Submittals shall be delivered to the Engineer at least 15 working days prior to installation at the project sites. The Engineer shall be allowed 5 working days for the review of the submittals. The submittals shall include product datasheets for all proposed electrical components required for a PV power supply for MVDS.

86-1.06C(1)(c)ii Microwave Vehicle Detection System

A list of materials that the Contractor proposes to install for the MVDS, together with the drawings and other data, must be submitted under section 86-1.04. Additionally, the following must be provided before the completion of the Contract:

2. Site Analysis Report - Prior to MVDS installation, the Contractor must review each detection site and provide a written analysis recommending the optimum sensor placement for complying with the performance requirements of this special provision. The analysis must be reviewed and approved by the Engineer.
3. Lane Configuration - The documentation must include a diagram that illustrates how the microwave beam is covering the traffic lanes as well as the MVDS connector pins or wire terminals that correspond to the respective lanes. The lanes must be identified by direction (i.e., NB, SB, EB, WB) and in order with lane one being the lane nearest to the center of the roadway.
4. Mounting and Wiring Information - The Contractor must provide to the Engineer for approval 1 set of detailed diagrams showing wiring and service connections for each MVDS. The approved diagrams must be covered separately on each side with clear self-adhesive plastic and placed in a heavy-duty plastic envelope. The envelope must be attached securely to the inside of the cabinet door or at a location designated by the Engineer.
5. Communication Protocol - The MVDS communication protocol must be open and must be freely available for use in the public domain. The Contractor must provide documentation that defines the complete MVDS communication protocol. The documentation consists of a message structure organization, data packet length, and all information necessary to make use of the messages. The MVDS communication protocol from the sensor to the personal computer shall conform to functional requirements described elsewhere in these special provisions. The proposed network configuration must be checked against the current configuration.
6. Remote Programming - The Contractor must provide all information and software necessary for operating the system from a remote Windows 2000/NT-based or newer PC. This information and software must include at minimum the capability to calibrate, tune, align, and program the MVDS and be provided on a CD compatible with Windows 2000/NT-based or newer PC. The information must be formatted so the files can be matched with the equipment being calibrated or aligned. This documentation must contain files that allow for replacement equipment to be loaded with the same configuration.
7. MVDS Accuracy Analysis - The Contractor must be responsible for conducting MVDS Performance Testing and must submit an MVDS accuracy analysis that complies with the requirements of the special provisions within 15 days of MVDS testing. The original video recordings as well as DVD or CD copies of the video images covering the analysis periods must be included.
8. Acceptance Testing Documentation - The Contractor must provide a test plan including the time and the period of the testing to the Engineer for approval. The test plan must be organized to allow the Engineer to perform acceptance testing by using the documentation and without assistance from the Contractor. The Contractor must collect and submit the data for approval. If requested, the data must be collected in the presence of the Engineer.
9. Acceptance Testing Schedule - The Contractor must submit a testing schedule to the Engineer for approval 15 days prior to acceptance testing of the MVDS. If the testing period extends beyond the normal working shift or if the Contractor fails to provide the necessary material for the testing within 1 hour of the scheduled testing start time, the Engineer may cancel the testing for the day.

86-1.06C(1)(d) Quality Control and Assurance

86-1.06C(1)(d)i Photovoltaic Panel Support

The Photovoltaic panels to be mounted must be compliant to the engineering drawings indicating either they are designed to withstand the maximum wind loads based on a fastest-mile basic design wind speed of 80 mph or they are designed to withstand the maximum wind loads based 3-second-gust basic design wind speed of 80 mph.

86-1.06C(1)(d)ii Microwave Vehicle Detection System

The Contractor must assure that the MVDS will not cause harmful interference to radio communication in the area of the installation as required by FCC part 15 regulation.

MVDSs must be FCC certified under part 15 regulations for low power, unlicensed, continuous radio transmitter operation. The MVDS must comply with FCC regulations for all specified operating conditions and over the expected life of the MVDS.

86-1.06 C(2) Materials The ramp metering system (stage construction) includes installing new or used microwave vehicle detection system (MVDS) with a photovoltaic power (PV) supply. MVDS data will be transmitted to the ramp metering system controller that is connected by fiber optic cable to the Transportation Management Center.

86-1.06C(2)(a) Photovoltaic Power Supply for MVDS

Each photovoltaic (PV) power supply for MVDS shall include a panel support structure, photovoltaic panels, batteries, a load/charge controller, a NEMA enclosure with components as shown on the plans and in conformance with these special provisions

The PV power supply for MVDS shall consist of components designed for outdoor use and approved by the Underwriters Laboratory.

Each PV power supply for MVDS shall be designed to provide 12 V(dc) to the MVDS 24 hours per day and shall be capable of operating four days without additional charge from the PV panels. A load / charge controller shall charge the batteries during daytime while providing 12 V(dc) to the MVDS 24 hours per day. Furnish a panel support structure, PV panels and the pole as shown on the project plans.

The PV power supply for MVDS shall be designed to operate in ambient air temperatures from -10°C to $+60^{\circ}\text{C}$.

Each PV power supply for MVDS shall include the following items:

ITEM	QUANTITY
Panel Support Structure	1
Photovoltaic Panels	1
Batteries	2
Load Charge Controller	1
NEMA Enclosure	1

86-1.06C(2)(a)i Panel Support Structure

The panel support structure shall hold the PV panels securely on the pole at the angle shown on the plans. **86-1.06C(2)(a)ii Photovoltaic Panels**

Each photovoltaic (PV) panel shall meet the following requirements:

PARAMETER	REQUIREMENTS
Power Output	From 123 W to 130 W
Voltage	From 17.2 V(dc) to 17.6 V(dc)
Current	From 6.98 to 7.55 A
Open Circuit Voltage	From 21.3 V(dc) to 21.9 V(dc)
Short Circuit Current	From 8.02 A to 8.10 A
Maximum System Voltage	600 V(dc)
Number of Cells per Module	36
Maximum Weight	14 kg
Maximum Dimensions	1500 mm (L) x 675 mm (W) x 58 mm (D)
Hailstone Impact Resistance	25 mm diameter at 50 mph
Operating Temperature Range	From -10 °C to +65 °C minimum range

When indicated on the plans, the installation of a second solar panel shall not exceed the combined values as shown in the following table. Operating temperature, Hailstone impact resistance, number of cells and voltage at maximum power specifications shall adhere to values as shown in the previous table.

PARAMETER	REQUIREMENTS
Minimum Power Production	190 W (See above)
Minimum Current	11 A
Maximum Short Circuit Current	12.5 A
Maximum Weight	48 lbs
Maximum Panel Area	16 ft ²

86-1.06C(2)(a)iii Batteries

Batteries shall be maintenance free, sealed, absorbed glass mat, deep cycle, and heavy duty. Each battery shall meet the following requirements:

PARAMETER	REQUIREMENTS
Voltage	12 V(dc)
Storage Capacity	50 A•h minimum at a 100 hour discharge rate
Maximum Discharge Current for 5 Seconds	500 A minimum

They shall be identical in make and model. All connections shall be marine grade. The batteries shall be interconnected in parallel to provide 12 V(dc). Interconnections shall be made with molded 3 prong plugs, provided as a power output connection and battery disconnect. An ATO water resistant fuse holder and specified for the given model system shall be included. The battery shall be 100 percent recyclable and capable of a minimum of 1000 cycles in this application.

86-1.06C(2)(a)iv Load/Charge Controller

Each load / charge controller shall regulate the voltage and current coming from the solar panels going to the batteries and to the load (MVDS components). The unit furnished shall be capable of set point selection compatible with the batteries supplied. The set point shall be chosen such that the battery float voltage is maintained without exceeding a voltage level that causes battery gassing.

The controller shall use pulse width modulation (PWM) switching. Each load / charge controller shall provide protection against lightning surges and switching noise. Each controller shall provide self-correction for battery charging temperature and system voltage drops.

Each load / charge controller shall meet the following minimum requirements:

PARAMETER	REQUIREMENTS
Rated Solar Current	15 A
Rated Load Current	15 A
System Voltage	12 V(dc) / 24 V(dc)
Digital Meter	Displays battery voltage, solar current and load current
Connections	Screw terminals for solar PV panels, battery and load
LED Indicators	Charging, battery status and temperature sensor
Load Disconnect Switch	Can disconnect the load or both the load and solar panel
Self-test	Tests all load/charge controller internal circuits.

The controller shall also have the following features:

1. Multi-stage charging (boost, equalization and float)
2. Battery charging temperature compensation
3. Battery low voltage disconnect (LVD)
4. Reverse polarity protection
5. High voltage disconnect
6. Panel reverse current disconnect

Supply the battery temperature probe as recommended by the manufacturer.

86-1.06C(2)(a)v NEMA Enclosure

Each NEMA enclosure shall be the type and size as shown on the plan sheets. The NEMA enclosure shall house the batteries and load/charge controller plus the MVDS surge protector, 12 V power distribution terminal strip, Ethernet hub and Ethernet radio as shown on the plan sheets. The battery compartment shall be separate and sealed from the equipment compartment.

The enclosure construction shall meet the cabinet construction specification as stated in Section 86-3.04A of the Standard Specification for aluminum sheet. The enclosure shall also comply with Section 86-3.04B of the Standard Specification. Ventilation locations shall be provided as shown on the plans.

86-1.06C(2)(b) Microwave Vehicle Detection System (MVDS)

86-1.06C(2)(b)(1) General

MVDSs must simultaneously provide vehicle detection data in the form of vehicle presence, volumes, counts, speed, classification, and occupancy for a minimum of 8 lanes of traffic and must comply with the performance requirements of the special provisions. MVDSs must provide a separate zone per lane and detect vehicles as close as 9.8 feet and as far as 197 feet from the MVDS sensor. MVDSs must monitor traffic lanes in the presence of barrier railings, guard railings, and other obstacles. Each MVDS sensor shall be connected via a MVDS cable (6-pair, 18 gauge conductors) into a MVDS surge protection module. The MVDS cable shall include both power and TIA-232 communication for the MVDS sensor. The TIA-232 output of the MVDS surge protection module shall be connected to the TIA-232 input of a wireless modem as shown on the plans.

MVDSs must comply with the following detection performance criteria when installed at a minimum of 9.8 feet from the nearest lane and at a minimum height of 16.4 feet above the roadway detection zone:

1. Average 5-minute volumes for all lanes combined with better than 95-percent accuracy compared to vehicles observed in video images for the same period for any 15-minute period selected by the Engineer.

2. Average 30-second volumes in every lane with better than 90-percent accuracy compared to vehicles observed in video images for the same period for any 5-minute period selected by the Engineer.
3. Average 30-second speed in any lane with better than 95-percent accuracy for any 5-minute period selected by the Engineer.
4. Average 5-minute occupancy for any lane with better than 85-percent accuracy for any 15-minute period selected by the Engineer.
5. Count accuracy, when compared to vehicles observed in video images for the same period, must be not less than 90 percent for any lane and not less than 95 percent for all lanes combined.
6. Average 15-minute classification according to user-defined criteria with better than 90-percent accuracy compared to vehicles observed in video images for the same period. Vehicle or length classification must be provided for categories of small car, average car, mid size car, long car, and extra-long car that are user definable by either length parameters, minimum length to maximum length for the category, or by a multiple of length of the average car.
7. provide the criteria for speed and volume acceptance testing for authorization. Also provide speed and volume data for verification by the Engineer.

MVDS must consist of a sensor unit and include all required mounting hardware, power supplies, surge suppression, cables, connectors, and wiring. The MVDS sensor must include, as a minimum, a directional microwave transmitter, antenna, microwave receiver, processor, memory, and communication interface.

The MVDS must have a TIA-232 or TIA-485 communication port that supports the National Transportation Communication for ITS Protocol (NTCIP). The MVDS communication protocol must be nonproprietary and openly specified and available for use in the public domain. The MVDS must be addressable and must download count, speed, and occupancy data when polled by the traffic management center computer. Speed must be configurable in U.S. customary units. The MVDS must support unit setup from a serial console port on the MVDS unit. The console port protocol must support sensor unit setup from a local Windows 2000/NT or newer compatible laptop or from a remote location with a desktop computer and standard phone modem.

When MVDS sensor contact outputs will be connected to Model 170E/2070L controller to emulate inductive loops, comply with the following:

1. The MVDS sensors must be connected to a microwave sensor interface card (MSIF) installed in the input file of a Department-furnished Model 170E or Model 2070L controller cabinet.
2. Each detection zone must provide an optically isolated relay contact pair that follows the presence of vehicles in every traffic lane and sends signals to the controller with the accuracy stated in the special provisions.
3. The MSIF must have indications for power, communication, and the real-time operation of each detection contact output.

The MTA must be a single circuit board or a set of modular DIN-rail rack-mounted assemblies. The MTA must provide screw cable-lug terminations for all MVDS units with clearance for routing the cables and labels to identify the connected MVDS detectors. The MVDS unit must be connected in the order shown or as ordered. Each lane detection zone must have an LED that indicates vehicle presence with a minimum viewing angle of 50 degrees and visible from 5 feet in daylight. Power must be routed from the MTA to each MVDS unit. Each MVDS power connection must have fast-blow AGC type fuse or a resettable circuit breaker so that the loss of power to any single MVDS due to overcurrent must not limit the operation of the other connected MVDS. The fuses or breakers must be easily accessible and replaceable or resettable without requiring tools or removing cables, connectors, or other terminations. The MTA must have DE9 male connectors for every connected MVDS unit for TIA-232 or TIA-485 communications and a local laptop computer for performing setup and diagnostics as well as remote communications. The connectors must be labeled and provide internal routing of data between the DB9 connectors and the MVDS terminal strips. MVDSs must be user programmable in the field via the MVDS unit console port with a Windows 2000/NT or newer compatible laptop computer. The Contractor must provide software, firmware, and equipment to set up, calibrate, and operate the unit. MVDS software must observe the vehicular traffic and automatically place detection lanes and set the sensor sensitivity. MVDSs must be designed so a trained Department employee can configure and calibrate the MVDS in less than 15 minutes per lane once the MVDS sensor unit is installed.

MVDS sensor unit must not exceed a wind projected area of 1.5 square feet and must not weigh more than 11 pounds. The MVDS must operate over a temperature range from –35 to +74 degrees C, with up to 95 percent relative humidity. The MVDS sensor enclosure must be weatherproof with a NEMA 4X rating and the sensor mounted and directed perpendicular to the flow of traffic lanes at the locations shown.

All electronic assemblies must comply with the specifications in chapters 1 and 5 of the TEES.

The MSIF must be inserted into the controller input file slots using the edge connector to obtain limited 24 V(dc) power and to provide contact closure outputs. No rewiring to the Model 170E or Model 2070L cabinet must be allowed. The MSIF must comply with the specifications in chapter 1 as well as sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, and 5.4.6, 5.5.1, 5.5.5, and 5.5.6 of TEES.

MVDS sensors must be wired with a connectorized cable harness. Cables must run continuously without splices between the sensor and the MVDS surge protection module where it terminates within the NEMA 4X enclosure. The connector must be a standard mil type and rated plug. The cable must have the number of conductors specified by the MVDS manufacturer to support the number of detection zones shown plus spares for 2 future zones with an overall shield and copper drain wire. Conductors must be stranded copper equal to or exceeding the minimum strands and wire dimensions specified by the MVDS manufacturer for the wiring distance involved and covered with a minimum 12 mils polyvinyl chloride (PVC) insulation rated for 300 V at 105 degrees C. The outer jacket must be chrome PVC with minimum thickness of 53 mils and the outside diameter of the cable must not exceed 3/4 inch. The power supply or transformer must comply with or exceed the following minimum requirements:

	Power supply	Transformer
Power cord	Standard 120V(ac), 3 prong cord, at least 40 inches in length (may be added by Contractor)	Standard 120V(ac), 3 prong cord, at least 40 inches in length (may be added by Contractor)
Type	Switching mode type	Class 2
Rated power	Twice (2x) full system load	Twice (2x) full system load
Operating temperature	From –35 to +74 °C	From –35 to +74 °C
Operating humidity range	From 5 to 95 percent	From 5 to 95 percent
Input voltage	From 90 to 135 V(ac)	From 90 to 135 V(ac)
Input frequency	60 +/- 1 Hz	60 +/- 1 Hz
Inrush current	Cold start, 25 A max. at 115 V	N/A
Output voltage	As required by the MVDS	As required by the MVDS
Overload protection	From 105 percent to 150 percent in output pulsing mode	Power limited at >150 percent
Over voltage protection	From 115 percent to 135 percent of rated output voltage	N/A
Setup, rise, hold up	800ms, 50ms, 15ms at 115V(ac)	N/A
Withstand voltage	I/P-0/P:3kV, I/P-FG:1.5kV, for 60 sec.	I/P-0/P:3kV, I/P-FG:1.5kV, for 60 sec
Working temperature	Not to exceed 70 °C@30percent load	Not to exceed 70 °C@30percent load
Safety standards	UL 1012, 60950	UL 1585

Field terminated circuits must include transient protection that complies with IEEE Standard 587 Category C.

The MVDS surge protection module shall meet or exceed the following minimum requirements:

	MVDS Surge Protection Module
Lines Protected	TIA-485, TIA-232 DTE with CTS / RTS DC Power
Protection Types: TIA-485 Surge TIA-232 Surge DC Power Peak Surge Current	Differential and Common Modes up to 4 kV minimum Clamping Voltage to 8 V(dc) Differential and Common Modes up to 4 kV minimum Clamping Voltage to 11 V(dc) Differential and Common Modes up to 4 kV minimum 10 kA (8 x 20 microseconds) minimum
Mounting	DIN rail
Operating Temperature	From -35 to +74 °C
Operating Humidity Range	From 5 to 95 percent

You must furnish the wireless modem.

The MVDS must automatically restore normal operation following a power failure within 3 minutes and not require manual intervention. The MVDS must maintain the configuration and calibration information in nonvolatile memory and retain the information while powered off for at least 90 days.

The MVDS must be configurable for 30-second to 24-hour polling cycles and store vehicle count, speed, classification, and occupancy data in 10-second to not less than 15-minute intervals.

The MVDS system and all supporting equipment must be designed to operate continuously in an outdoor traffic monitoring and control environment. Provide equipment required to set up, calibrate, verify performance, and maintain the MVDS.

Provide programming software needed to support the MVDS. Provide video camera to verify the accuracy of the MVDS system by comparing the MVDS vehicle counts to recorded video image counts for the same period. Video images must be time stamped and analysis periods recorded to a DVD or CD media for viewing on a PC. The video field of view must totally encompass the area in which vehicles are detected. Provide a means for synchronizing the test starting and ending times or provide software that displays time stamped MVDS data along with the video images of the moving vehicles. Provide the Engineer with the original recording medium and documentation that supports the accuracy analysis. The Engineer will review the accuracy data findings and accept or reject the results within 15 days. Determination of vehicle anomalies or unusual occurrences will be decided by the Engineer. Data or counts that are not accepted by the Engineer must be considered errors and count against the MVDS unit's calibration. .

86-1.06 C(3)Construction

86-1.06 C(3)(a) Photovoltaic Power Supply for MVDS

Install the panel support structure and securely fasten the PV panels to the pole as shown on the project plans.

Orient the PV panels directly south to maximize the collection of solar energy.

Install the battery temperature probe recommended by the manufacturer.

Supply the cable and connectors for connecting the communication modem as shown and specified in the special provisions.

86-1.06 C(3)(b) Temporary Microwave Vehicle Detection System

Install an MVDS termination assembly (MTA) as shown.

Coil a minimum of 3 feet slack of MVDS cable inside the NEMA 4X enclosures. Coil a minimum of 6.5-foot slack of MVDS cable at the bottom of the controller cabinet.

Mount MVDS surge protection module vertically on a standard DIN-rail rack using standard mounting hardware. Wire the MVDS power conductors to the DIN-rail mounted surge protection module. Terminate the serial data communication output conductors on the surge protection module. Terminate the contact pair output conductors at terminal block, TB-2. Coil and tape the ends of unused and spare conductors to prevent accidental contact to other circuits. Label conductors inside the cabinet for the functions as shown on the authorized detailed diagrams.

Install a MVDS surge protection module at each MVDS location within the NEMA 4X enclosure as shown on the plans.

Install a GSM based GPRS/EDGE wireless modem at each MVDS location as shown on the plans.

Install the MVDS units such that each unit operates independently and does not interfere with other MVDS units or other equipment in the vicinity.

You are responsible for site visits and analysis of each proposed pole location to assure that the detector placement will comply with the manufacturer's published installation instructions and the performance required in the special provisions. Confirm detector placement with the manufacturer before performing work at the MVDS location. Whenever the manufacturer's analysis requires a change in the proposed pole location, arrange a meeting with the manufacturer and the Engineer to select a new pole location.

Do not proceed with any MVDS installation until the pole location is approved.

You are responsible for the compatibility of components and for making necessary calibration adjustment to deliver the performance required in the special provisions. Verify accuracy of the MVDS system by comparing the MVDS vehicle counts to recorded video image counts for the same period. Locate and orient the video camera so that traffic is visible in all lanes.

The accuracy test must take place during a complex traffic period as specified by the Engineer. The following video recording and analysis options that depend on the available traffic conditions are acceptable; however the heaviest expected traffic conditions should be used, if possible:

1. The minimum recording period must be 30 minutes when the recording includes congested traffic (vehicles traveling at less than 20 mph for five or more minutes in any lane).
2. The minimum recording period must be 45 minutes when the traffic flow exceeds 1500 vehicles per hour in any lane during the test period.
3. The minimum recording period must be 60 minutes when the flow is less than 1500 vehicles per hour in every lane.

The analysis must be based on a minimum of 100 detected vehicles in every lane and cover the same time period for all lanes. The time period within the selected video will be selected by the Engineer. The total vehicle count for every lane must be used and include the first and last partial vehicles for each lane. Errors in the start and finish of the MVDS and manual counts are included in the performance criterion specified in the special provisions.

MVDS unit count must be compared to the vehicle counts under these traffic conditions. Vehicles licensed for use on State roads must be counted by the MVDS. The data accuracy must be determined by the formula $100\{1 - [(TC - MC)/TC]\}$, where TC=traffic count derived from the media recording, MC=MVDS-reported count over the same period of time, and the resulting fraction is expressed as an absolute value.

The accuracy of each MVDS unit must be determined and documented so each unit may be authorized or rejected separately by the Engineer. Failure to submit the materials at the conclusion of testing invalidates the test. The recorded media serves as acceptance evidence and must not be used for calibration. The calibration must have been completed prior to testing and verification.

If the Engineer finds that the MVDS does not comply with the performance requirements, you must recalibrate and retest the unit and resubmit new test data within 10 days. Following 3 failed attempts, the Contractor must replace the MVDS detector with a new unit.

Schedule testing before the end of the normal work shift.

Simulate a 4 day cloudy condition during system burn-in period starting no later than 3 days after start of the burn-in period. Demonstrate that the system is operating properly once the burn-in period has been completed. The system shall be operated for a 14 day burn in period.

86-1.06C(4) Payment

Not Used.

Add to Section 86-1.06:

86-1.06D Temporary Traffic Monitoring Station

86-1.06D(1) General

86-1.06D(1)(a) Summary

Section 86-1.06D includes specifications for installing and removing components for temporary traffic monitoring station during stage construction.

86-1.06D(1)(b) Definitions

APN: Access Point Name

IMEI: International Mobile Equipment Identification

IP: Internet Protocol

PCCA: Portable Computer and Communications Association

PDP: Packet Data Protocol

PPP: Point to Point Protocol

SIM: Subscriber Identity Module

TCP: Transmission Control Protocol

UDP: User Datagram Protocol

86-1.06D(1)(d) Quality Control and Assurance

Provide and maintain complete data reliability for the duration of the project stage construction.

Configure all modems before acceptance. Provide the modem serial, SIM and IMEI numbers 30 days before requiring the PDP context.

86-1.06D(2) Materials

The temporary traffic monitoring station during stage construction includes installing new or used microwave vehicle detection system (MVDS) with a photovoltaic power supply and temporary GPRS equipment.

86-1.06D(2)(a) Temporary Microwave Vehicle Detection System

For temporary microwave vehicle detection system, refer to the specifications included in "Ramp Metering System (Stage Construction)" of these provisions.

86-1.06D(2)(a)i Photovoltaic power supply for Temporary MVDS

For temporary photovoltaic power supply for temporary microwave vehicle detection system, refer to the specifications included in "Ramp Metering System (Stage Construction)" of these provisions.

86-1.06D(2)(b) Temporary GPRS Equipment

The temporary GPRS equipment must provide and maintain wireless data transmission between the field units and the Transportation Management Center (TMC) during construction. The temporary GPRS equipment must consist of a GPRS modem, power supply, serial cable, GPRS antenna and antenna cable.

The temporary GPRS equipment must communicate with the existing telecommunications service provider's GPRS/EDGE (Enhanced Data rates for Global system for mobile communications Evolution) system currently being used in the District. Provide software, cabling and configure the temporary GPRS modem.

86-1.06D(2)(b)i Temporary GPRS Modem

The modem must be compatible to the existing AT&T telecommunication service.

The modem shall be configured with the following major components:

1. Modem
2. Power supply
3. Modem mounting bracket and hardware
4. Serial communication cable – Type D
5. Antenna

Modems at all locations must be configurable remotely through the wireless network and through the modem serial port. The Engineer will make available the PDP context comprising the IP (assigned) and APN (obtained from service provider). All modems shall be complete with all cables, conductors, hardware, antenna and other equipment as required to make the system completely operational. Location and mounting of the equipment shall be as shown and as directed by the Engineer. The modems shall be fully compliant with TIA-678.

The operating temperature of the modem shall range from –35 to +75 degrees C with humidity from 5 to 95 percent (non-condensing) and have transmissions at 10 percent duty cycle above 60 degrees C.

The housing shall be constructed of anodized aluminum.

The modem shall have the following status indicators:

1. Power (on).
2. Channel acquired.
3. Link status.
4. Network registration.
5. Received signal strength indicator.
6. Transmit and receive data.
7. Block errors.

The modem shall operate in a dynamic IP addressing environment of GPRS networks at 1900/850 MHz and meet the following operational parameters:

Receiver sensitivity	-107 dBm (2.4 percent bit error rate)
Input voltage	From 10 to 28 V(dc)
Input current	From 40 mA to 200 mA

The modem shall have the following standard interfaces:

1. TIA 232 serial port
2. The AT command serial character stream uses TCP/IP.
3. Host communicates with modem using either UDP or TCP packet modes.
4. Computer terminal platform using Windows 7/XP and Dial-Up Networking communicates with the modem using PPP.

The modem shall have the following additional features:

1. Integrated Java programming
2. Remote reset of field devices
3. I/O pins for detection and control
4. Integrated TCP/IP protocol stack with UDP
6. Includes a DC power cable with a connector
7. Packet buffering and forwarding feature that provides discipline to the output of the serial port. The packet forwarding time interval shall be configurable from a rate of 0 (undisciplined) to 400 ms in increments of 100 ms .

Where the modem is designed to interface with a State-furnished Model 170E controller, provide a communication cable known as the C2 cable. The C2 cable must interface the Department- furnished Model 170E controller C2 connector and the GPRS modem and include all conductors and connectors required for that purpose. The GPRS modem connector must meet TIA-232 standard using a 9 pin Type D connector. All pins in both connectors must be gold plated. The cable must have four No. 20 AWG conductors with (UL) Type CM shielded or AWM 2464 80C 300 Volts –CMG. The cable wiring must comply with the following:

1. AMP 201360-2-ND -L to DE9-P - 2
2. AMP 201360-2-ND -K to DE9-P - 3
3. AMP 201360-2-ND -N to DE9-P - 5
4. AMP 201360-2-ND -D to AMP 201360-2-ND – H
5. AMP 201360-2-ND -J to AMP 201360-2-ND – M

86-1.06D(2)(b)ii Temporary GPRS Power Supply

The power supply shall be vertically mountable on a 19-inch standard rack rail using two machine screws and 2 wing nuts. The power supply shall have provisions to attach the modem power cable securely .

The power supply shall meet the following requirements:

Power Cord	Standard 120 V(ac), 3 prong cord,
Type	Switching mode type
Power Rated	40 W minimum
Operating Temperature Range	From –35 to +75 degrees C
Operating Humidity Range	From 5 to 95 percent non-condensing
Input Voltage	From 85 to 264 V(ac)
Input Frequency	From 47 to 63 Hz
Inrush Current	Cold start, 25 A at 115 V
Output Voltage	12 V (dc), adjustable over a ± 10 percent range
Overload Protection	From 105 to 150 percent in output pulsing mode
Over Voltage Protection	From 115 to 135 percent of output voltage
Setup, Rise, Hold Up Time	800 ms, 50 ms, 15 ms at 115 V(ac)
Withstand Voltage	I/P-O/P: 3 kV, I/P-FG: 1.5 kV, for 60 seconds
Working Temperature	75 °C
Safety Standards	UL 1012, 60950

86-1.06D(2)(b)iii Temporary GPRS Antenna

The antenna shall be the low profile type, and shall adhere to the cabinet using double-sided waterproof acrylic foam adhesive. The coax cable shall have a 50 Ω TNC connector on the modem end. In addition, the antenna shall meet the following requirements:

VSWR (at resonant point)	2:1 or less
Frequency Bands	From 1850 to 1990 MHz and from 824 to 894 MHz
Nominal Impedance	50 Ω
Gain	2 dB
Radiation Pattern	Omni-directional
Polarization	Vertical
Ground Plane Required	Yes, see note below

Provide a reflective ground plane for the antenna to function properly. The required ground plane shall extend beyond the antenna at least 8" inches in all directions.

86-1.06D(3) Construction

Install, integrate, test and remove all equipment and components necessary to provide the temporary GPRS system during construction. Plug any holes left in the cabinet with a raintight plug and sealant.

Install the general packet radio system (GPRS) modem at the controller cabinets as shown.

The installation of the modem must be according to the plans, the manufacturer's instructions, and adjusted per field conditions.

Install temporary equipment as shown and it must be capable of interacting with the Model 170 controller located inside the controller cabinet. You must secure all components and cables to the rack or cabinet as necessary. Configure the temporary GPRS modem for connection to the existing wireless telecommunications provider's GPRS system.

86-1.06D(4) Payment

Cellular Service

For the duration of the temporary installations, you are responsible for all fees and charges including monthly service charges associated with providing communication between the temporary traffic monitoring station shown on the plans and the District 12 TMC.

Add to Section 86-1.06:

86-1.06E Temporary Communication System

86-1.06E(1) General

Section 86-1.06E includes specifications for temporary communications system.

86-1.06E(1)(a) Summary

Temporary communication system includes installation, relocating and removal of temporary communication system on completion of permanent installation.

86-1.06E(1)(b) Definitions

Not Used

86-1.06E(1)(c) Submittals

Not Used

86-1.06E(1)(d) Quality Control and Assurance

86-1.06E(1)(d)i Fiber Optic Cable System

After installation, 100 percent of all temporary fiber optic cables must be tested bidirectional with an OTDR for attenuation. Loss of any splice shall not be greater than 0.07 dB

86-1.06E(2) Materials

86-1.06E(2)(a) Fiber Optic Cable System

Temporary fiber optic cable must meet the requirements of "Modify Communications System" of these special provisions.

86-1.06E(3) Construction

86-1.06E(3)(a)Fiber Optic Cable System

Install, test and remove temporary fiber optic cables as shown.

86-1.06E(4) Payment

Not Used

Add to section 86-2.03B:

Use sleeve nuts on Type 1-A standards. The bottom of the base plate must be flush with finished grade.

Add to section 86-2.04A:

Set the Type 1 standards with the handhole on the downstream side of the pole in relation to traffic or as shown.

Add to section 86-2.05A:

Communication conduit shall be Type 3 Schedule 80. All other underground conduits shall be Type 1.

Add to section 86-2.05B:

The conduit in a foundation and between a foundation and the nearest pull box must be Type 1.

Add to section 86-2.05C:

If a standard coupling cannot be used for joining Type 1 conduit, use a UL-listed threaded union coupling under section 86-2.05C, a concrete-tight split coupling, or a concrete-tight set screw coupling.

If Type 3 conduit is placed in a trench, not in the pavement or under concrete sidewalk, after the bedding material is placed and the conduit is installed, backfill the trench to not less than 4 inches above the conduit with minor concrete under section 90-2, except the concrete must contain not less than 421 pounds of cementitious material per cubic yard. Backfill the remaining trench to finished grade with backfill material.

After conductors have been installed, the ends of the conduits terminating in pull boxes, service equipment enclosures, and controller cabinets must be sealed with an authorized type of sealing compound.

The final 2 feet of conduit entering a pull box in a reinforced concrete structure may be Type 4.

Delete items 2–5 in the list in the 2nd paragraph of section 86-2.06A(2).

Add to section 86-2.06A(2):

Do not place grout in the bottom of the pull box.

Replace "Reserved" in section 86-2.06B of the RSS for section 86-2.06 with:

86-2.06B(1) General

86-2.06B(1)(a) Summary

This work includes installing non-traffic-rated pull boxes.

86-2.06B(1)(b) Submittals

Before shipping pull boxes to the jobsite, submit a list of materials, Contract number, pull box manufacturer, manufacturer's instructions for pull box installation, and your contact information to METS.

Submit reports for pull box from an NRTL-accredited lab.

86-2.06B(1)(c) Quality Control and Assurance

86-2.06B(1)(c)(i) General

Pull boxes may be tested by the Department. Deliver pull boxes and covers to METS and allow 30 days for testing. When testing is complete, you will be notified. You must pick up the boxes and covers from the test site and deliver it to the job site.

Any failure of the pull box or the cover that renders the unit noncompliant with these specifications will be a cause for rejection. If the unit is rejected, you must allow 30 days for retesting. Retesting period starts when the replacement pull box is delivered to the test site. You must pay for all retesting costs. Delays resulting from the submittal of noncompliant materials does not relieve you from executing the Contract within the allotted time.

If the pull box submitted for testing does not comply with the specifications, remove the unit from the test site within 5 business days after notification that it is rejected. If the unit is not removed within that period, it may be shipped to you at your expense.

You must pay for all shipping, handling, and transportation costs related to the testing and retesting.

86-2.06B(1)(c)(ii) Functional Testing

The pull box and cover must be tested under ANSI/SCTE 77, "Specifications for Underground Enclosure Integrity."

86-2.06B(1)(c)(iii) Warranty

Provide a 2-year manufacturer replacement warranty for pull box and cover from the date of installation of the pull box and cover. All warranty documentation must be submitted before installation.

Replacement parts must be provided within 5 business days after receipt of failed pull box, cover, or both at no cost to the Department and must be delivered to the Department's Maintenance Electrical Shop at Batavia Maintenance Yard, 1808 North Batavia, Orange, CA 91865.

86-2.06B(2) Materials

The pull box and cover must comply with ANSI/SCTE 77, "Specifications for Underground Enclosure Integrity," for Tier 22 load rating and must be gray or brown in color.

Each pull box cover must have an electronic marker cast inside.

Extension for the pull box must be of the same material as the pull box and attached to the pull box to maintain the minimum combined depths as shown.

Include recesses for a hanger if a transformer or other device must be placed in a pull box.

The bolts, nuts, and washers must be a captive bolt design.

The captive bolt design must be capable of withstanding a torque range of 55 to 60 ft-lb and a minimum pull out strength of 750 lb. Perform the test with the cover in place and the bolts torqued. The pull box and cover must not be damaged while performing the test to the minimum pull out strength.

Stainless steel hardware must have an 18 percent chromium content and an 8 percent nickel content.

Galvanize ferrous metal parts under section 75-1-.05.

Manufacturer's instructions must provide guidance on:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below Tier 22 load rating
2. Where side entries cannot be made
3. Acceptable method to be used to create the entry

Tier 22 load rating must be labeled or stenciled by the manufacturer on the inside and outside of the pull box and on the underside of the cover.

86-2.06B(3) Construction

Do not install pull box in curb ramps or driveways.

A pull box for a post or a pole standard must be located within 5 feet of the standard. Place a pull box adjacent to the back of the curb or edge of the shoulder. If this is impractical, place the pull box in a suitable, protected, and accessible location.

Bury pull box in soil 6 to 8 inches below grade. Cover the pull box with a plastic sheet before burying it.

Plastic sheets must be 20 mil thick and made of HDPE or PVC virgin compounds.

If only the cover is to be replaced, anchor the cover to the pull box.

Add to section 86-2.08A:

Wrap conductors around the projecting end of conduit in pull boxes as shown. Secure conductors and cables to the projecting end of the conduit in pull boxes.

Replace the 1st sentence of the 1st paragraph of section 86-2.08E with:

Signal interconnect cable must be the 12 pair type with stranded tinned copper no. 19 conductors.

Replace the 1st paragraph of section 86-2.09E with:

Splices must be insulated by "Method B." Splices for loop wires to loop detector lead-in cable must be insulated by "Method B" , in addition a heat-shrink tubing must be placed over the entire splice. Both the loop start wire and finish wire splices must be placed in the same heat-shrink tubing.

Delete the 7th paragraph of section 86-2.09E.

Add to section 86-2.11A:

Continuous welding of exterior seams in service equipment enclosures is not required.

Circuit breakers must be the cable-in/cable-out type mounted on non-energized clips. All circuit breakers must be mounted vertically with the up position of the handle being the "ON" position.

Each service must be provided with up to 2 main circuit breakers that will disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as described, each of the circuit breakers must have a minimum interrupting capacity of 10,000 A, rms.

Replace 7th and 8th paragraphs of section 86-2.11A with:

Service equipment enclosures must be the aluminum type.

Replace "Reserved" in section 86-2.11B with:

Electric service (irrigation) must be from the service points to the irrigation controllers (IC) and to the spaces provided in the irrigation controller enclosure cabinets (CEC) for irrigation controllers as shown.

Irrigation Controller (IC) A, C, D, and E : Electric service (irrigation) must be a metered 120/240 V(ac), single-phase service in a Type III service equipment enclosure.

Service disconnects in service equipment enclosures must be 1-pole, 15-A circuit breaker.

Nameplate inscriptions must be as follows:

Item	Inscription
Metering equipment enclosure	IC _____
Service disconnect	IC _____

The inscription on the other nameplates must be the letter designation used on the plans and in the special provisions.

Conductors, conduit, and pull boxes to the pull box adjacent to irrigation controller enclosure cabinets and irrigation controllers are included in the payment for electric service (irrigation).

Add to Section 86-2.14:

86-2.14D System Testing and Documentation86-2.14D(1) General

System testing and documentation covers the integration testing (video and data) which is required to validate the operational performance of the communication system.

86-2.14D(1)(a) Submittals

System Documentation Submit a draft copy of all documentation for review and approval before production of documentation. The Engineer will review and approve or reject the draft documentation within 4 weeks of receipt.

Modify the documentation if required and submit provisional documentation. The Engineer will approve or reject the provisional documentation within 3 weeks of receipt. Arrange for re-submission in a timely manner to meet the schedule in case the documents are rejected.

Submit draft documentation eight weeks before the start of installation. The draft documentation must show the general approach in preparing the final manuals.

Upon approval of the draft documentation, provisional documentation must be supplied 3 weeks before the start of site testing. The provisional documentation must be of the same format as the final manuals but with temporary insertion for items which cannot be finalized until the system is completed, tested and accepted.

Submit final documentation no later than 4 weeks after completion of the acceptance tests and it must incorporate all comments made during the approval stages. You will be responsible for all delays caused by non-compliance to the specified requirements.

Final documentation must be approved before its reproduction.

Deliver ten copies of all final documents. The copies must be 8 1/2" x 11" and bound in three-ring, hard-covered binders, complete with dividers.

Documentation must consist of the following types of manuals and drawings and must include the information described.

1. System Description and Technical Data
 - 1.1. The system description and technical data section must contain an overall description of the system and associated equipment and cables with illustrative block diagrams.
 - 1.2 This section must identify all equipment and cables in the system stating the exact module and option number that are employed in the system. Technical data, specification and settings for every type of equipment or cable must be provided. Any modification that has been done on the equipment must be clearly described.
2. Configuration of Hardware and Software Documentation
 - 2.1 Provide proper documentation for all configurations of hardware and in-built software. The configurations of hardware and in-built software documentation must include a clear description of the system's functionalities and specifications. Description on each configuration of hardware and in-built software modules and programs must be provided.
3. Operations
 - 3.1 Describe how to operate the system and each particular type of equipment and software. Equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate the system and each functional unit must be provided.
 - 3.2. Procedures must also be provided for initial tune-up of the system and adjustment and checkout required to ensure that the system is functioning within the performance requirements. Warning of special procedures must be given. The functions and setting of all parameters must be explained.
4. Corrective Maintenance
 - 4.1 Include fault diagnostic and repair procedures to permit locating and correcting faults at the replaceable module level. Procedures must include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.
5. Preventative Maintenance
 - 5.1 Include procedures for preventative maintenance in order to maintain the performance parameters of the system, equipment and cables within the requirements of the specifications.
6. Test Results
 - 6.1. The test result section of the operations and maintenance must include a copy of the results for all the tests that you have conducted.
 - 6.2. You must provide system schematic drawings to identify the type of equipment at each location and the function of all equipment. The drawings must show how the system is interconnected. You must also provide a comprehensive list of cabling and wiring to clearly identify the interconnection and labeling of all equipment both in the field, at existing cable node, at existing hub, and at the TMC.

86-2.14D(1)(b) Quality Control and Assurance

86-2.14D(1)(b)(i) Subsystem Testing

You must test all material, equipment and cable after installation. These tests must comply with the "Performance Testing" sub-sections for each individual item where applicable.

You must supply all test equipment required.

You must submit an installation and test plan which details the method of installation and site testing for all material, equipment, and cable and the associated schedule of activities. Five copies of the installation and test plan must be submitted for approval, at least 2 weeks before proposed testing dates.

The equipment and hardware must be installed as shown and described. Tests and inspections must include:

1. Visual inspection for damaged or incorrect installation.
2. Adjustments and alignment.
3. Measurement of parameters and operating conditions.

These tests must be performed in accordance with the approved installation and test plan.

You must notify the Engineer of your intent to proceed with installation and testing 48 hours before commencement of each test.

Installation documentation and test results must be provided for all material, equipment and cable before submission of the acceptance test plan and commencement of acceptance tests. The documentation must be in accordance with the contract and must include the following as appropriate:

1. Model and part number for all material
2. Test equipment model number, serial number, settings, and date of last calibration
3. All strap and switch settings
4. Record of all adjustments and levels
5. Alignment measurements
6. Identification of interconnections
7. All factory, laboratory and site test results

86-2.14D(1)(b)(ii) Physical Inspection

You must provide documentation to prove delivery of all material, equipment, cable and documentation. If any material or documentation is outstanding or have been replaced under pre-acceptance warranty a physical inspection and documentation must be provided for this material. The physical inspection must consist of inspecting all installed material to ensure that workmanship satisfies the specified requirements.

86-2.14D(1)(b)(iii) Data Link Testing

From Hub #3 (NB I-5 at Avery) and from TMC(Transportation Management Center) (I-5/Sand Canyon) , with the communication system functioning under normal condition, 'ping' each element (CMS, CCTV, TMS, RMS, TS) using test computer to verify all of the hardware is properly connected and responding to the assigned IP address. Each element should have a unique IP address and a valid response to a 'ping' verifies the reliability of the IP address for each element. Verify that each element responds and record the response time for each ping. The pinging of elements shall also include the pinging of multicast addresses.

86-2.14D(1)(b)(iv) Video Link Testing

You must conduct video link testing on the following:

1. Between field cabinet and corresponding field camera sites
2. Between Avery Hub (NB I-5 at Avery) and the corresponding field camera sites
3. Between Transportation Management Center (I-5/Sand Canyon) and corresponding field camera sites

The video link testing must be conducted after you submit a test plan and receives approval based on these special provisions, plans and the manufacturer's recommended test procedures for the equipment involved. Measurements must be made from the baseband-in (output of camera control receiver) to baseband-out connections.

A video communication link must include a video transmitter, video receiver, interconnecting optical fiber, connectors and power supplies. The video link is to provide point-to-point transmission and reception of a full motion National Television System Committee (NTSC) baseband video signal using an optical fiber as the transmission medium. Video system performance tests for any particular video link must be performed after the associated camera has been installed and tested.

Each video link in the communication system must be tested with a video test signal at the transmitter input. You must perform all level adjustments and alignments required on the video link in order for it to operate in accordance with these special provisions. If any video link fails to meet the performance requirements, you must take all steps necessary to restore the failed link to the required performance.

Each video link in the communication system must be tested for qualitative performance with its associated camera turned on and connected to the BNC connector of the video link transmitter. You must measure and record the received optical power at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL (average picture level) flat field input to the transmitter.

You must measure, record and tabulate the receiver's dynamic range at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL flat field input to the transmitter.

For all tests required under dynamic range at the optical connector the measured optical attenuation of the fiber being used must be increased to the point at which the video test set just begins to show a 3 dB degradation of the video signal to noise ratio in accordance with TIA-250 video test procedures. The optical receive power into the video receiver must be measured and recorded. Then the optical attenuation must be decreased until the video test set once again shows degradation of the video and registers errors.

The output video signal must be connected to a monitor. The observed picture on the monitor will be assessed for qualitative performance.

You must measure, record and tabulate the receiver's dynamic range at the optical connector of the video decoder from the video encoder under test.

The optical power into the receiver exceed the manufacturer's specified saturation level. These minimum and maximum receive levels define the video decoder's dynamic range and must meet or exceed the specifications as specified under these special provisions.

Each video link must be tested for the following performance characteristics. You must measure, record and demonstrate that the performance meets or exceeds the specified TIA-250 medium haul requirements listed below:

1. Differential gain
2. Differential phase
3. Chrominance to luminance delay inequality
4. Frequency response characteristic
5. Signal to noise ratio
6. Signal to low frequency noise
7. Signal-to-periodic-noise
8. Output signal level

86-2.14D(1)(b)(v) Acceptance Testing

Acceptance testing includes the preparation of an acceptance test plan, conducting acceptance tests and subsequent retests, and documentation of the results.

Final acceptance tests must be conducted after the site test results have been reviewed and accepted. These tests include the complete system in normal operations.

You must submit 5 copies of the acceptance test plan for approval before commencement of acceptance testing. The acceptance test plan must address the full testing requirements of the specifications.

The acceptance test plan must detail all tests to be performed, the test results which are expected and the test schedule. The acceptance test plan will include the following major tests and acceptance categories:

1. Successful acceptance of subsystem testing
2. Performance tests after connecting the system.
3. Functional tests after connecting the system.

The model and part numbers and date of last calibration of all test equipment must be included with the test results.

Acceptance testing must not commence until all material required is delivered, installed, and aligned and all production test and site test documentation and results have been approved.

All acceptance test results must be fully documented and such documentation provided as a condition of acceptance.

86-2.14D(1)(b)(vi) Performance Tests

You must conduct operational performance tests on the following:

1. All video links from the camera output to the input of the color monitors in Hub #3
2. All data circuits operational from Hub #3 to the field equipment.

Video tests must satisfy the end-to-end performance requirements under normal operating conditions. Video tests must be measured with the video test equipment injecting a test signal in place of the camera output in the field, as appropriate.

You must test the video subsystem and record the results:

1. The video signal to noise must be measured according to TIA-250. The video signal to noise ratio must be measured and recorded with suitable video test equipment providing the video reference signal. The video signal to noise ratio must be greater than 47 dB.
2. The video signal to low frequency noise ratio must be measured according to TIA-250. The resulting video signal to low frequency noise ratio must be greater than 39 dB. If an Automatic Gain Control circuit does not allow measurement as per TIA-250, you must submit an alternative test plan for approval.
3. The video signal to periodic noise ratio must be measured according to TIA-250. The resulting video signal to periodic noise ratio must be greater than 52 dB.
4. If any circuit or element fails to satisfy the specified performance requirements, you must determine the cause and remedy the failure to the satisfaction of the Engineer. The full performance tests must be repeated under operating conditions as determined by the Engineer.

86-2.14D(1)(b)(vii) Functional Tests

You must test in the presence of the Engineer all integrated system functions to demonstrate that all circuits, cameras, camera control, and all equipment satisfies the functional requirements of the specifications.

Functional testing must include subjective testing of each camera image and verification of camera control from the camera control unit. The connectivity of each data channel must be demonstrated.

You must document all functional test results.

In the event that any aspect of the functional tests is determined by the Engineer to have failed, you must cease all acceptance testing and determine the cause of the failure. If the failure is due to a defect within your furnished portion of the system, You must make repairs to satisfaction. Acceptance testing must, at the discretion of the Engineer, be repeated from the start of functional tests.

86-2.14D(1)(b)(viii) Final Acceptance

The system will not be accepted until all of the following conditions have been met as follows:

1. Physical, performance, and functional acceptance tests have been completed and the results are approved.
2. All documentation has been completed and submitted.
3. All connections that were changed to perform acceptance tests are restored and tested.

Upon completion of acceptance tests you must connect all equipment to form a fully operational system.

86-2.14D(2) Materials

Not Used

86-2.14D(3) Construction

Not Used

86-2.14D(4) Payment

Not Used

Replace section 86-2.18 with:

86-2.18 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

Add to section 86-2:

86-2.19 Communication System

86-2.19A General

This work applies when fiber optic communication system is shown on the project plans.

86-2.19A(1) Summary

Fiber optic communication system consists of installing and testing fiber optic outside plant cable, fiber optic splice enclosure, fiber optic cable terminations, fiber optic distribution Unit (FDU), Edge Ethernet Switch (EES), splice vault, innerduct, innerduct sealing plug, splice tray, tracer wire, color concrete back fill, warning tape, passive cable assemblies and components, and system verification, all as shown on the plans and in the special provisions

86-2.19A(2) Definitions

Active Component Link Loss Budget: The active component link loss budget is the difference between the average transmitter launch power (in dBm) and the receiver maximum sensitivity (in dBm).

Connector: A mechanical device used to align and join 2 fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel).

Connectorized: The termination point of a fiber after connectors have been affixed.

Couplers: Devices which mate fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They are normally located within FDUs, mounted in panels. They may also be used unmounted, to join 2 simplex fiber runs.

End-to-End Loss: The maximum permissible end-to-end system attenuation is the total loss in a given link. This loss could be the actual measured loss, or calculated using typical (or specified) values. A designer should use typical values to calculate the end-to-end loss for a proposed link. This number will determine the amount of optical power (in dB) needed to meet the System Performance Margin.

Fiber Distribution Unit (FDU): An enclosure or rack mountable unit containing both a patch panel with couplers and splice tray(s). The unit's patch panel and splice trays may be integrated or separated by a partition.

FO: Fiber optic.

FOOP: Fiber optic outside plant cable.

FOTP: Fiber optic test procedure(s) as defined by TIA/EIA standards.

Jumper: A short cable, typically one meter or less, with connectors on each end, used to join 2 CMH couplers or a CMH to active electronic components.

Light Source: Portable fiber optic test equipment that, when coupled with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the wavelength of the system under test.

Link: A passive section of the system, the ends of which are connectorized. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (MUX).

Optical Time Domain Reflectometer (OTDR): Fiber optic test equipment similar in appearance to an oscilloscope that is used to measure the total amount of power loss in a F/O cable between 2 points. It provides a visual and printed display of the losses associated with system components such as fiber, splices and connectors.

Patch Panel: A precision drilled metal frame containing couplers used to mate 2 fiber optic connectors.

Pigtail: A short optical fiber permanently attached to a source, detector, or other fiber optic device.

Power Meter: Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of optical power being received at the end of the link.

Segment: A section of F/O cable that is not connected to any active device and may or may not have splices per the design.

SMFO: Single mode Fiber Optic Cable.

Splice: The permanent joining of two fiber ends using a fusion splicer.

Splice Enclosure: An environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations. Normally installed in a splice vault.

Splice Tray: A container used to organize and protect spliced fibers.

Splice Vault: An underground container used to house excess cable and/or splice enclosures.

Tight Buffered, Non-Breakout Cable (Tight Buffer Cable): Type of cable construction where each glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 μm (compared to 250 μm for loose tube fibers).

86-2.19A(3) Submittals

Submit a manufacturer's sample of fiber optic cable, 10 feet in length, with part numbers and original catalog and documents, to the Engineer.

A minimum of 10 working days before the scheduled delivery of the fiber optic outside plant cable to the project site, submit documentation of detailed factory test procedures and results for the Engineer's review and approval.

The procedures must identify the cable tests performed and conducted. Included in the test procedures must be the model, manufacturer, configuration, calibration and alignment and operating procedures for all proposed test equipment.

Submit two copies of the manufacturer's cable installation procedures and technical support information to the Engineer at least two weeks before the scheduled delivery of the cable to the project site.

86-2.19A(4) Quality Control and Assurance

Testing must include the tests on elements of the passive fiber optic components: (1) at the factory, (2) after delivery to the project site but prior to installation, (3) after installation and (4) during final system testing. Test the active components after installation.

You must provide all personnel, equipment, instrumentation and materials necessary to perform all field testing. Notify the Engineer two working days prior to all field tests. The notification must include the exact location or portion of the system to be tested.

86-2.19A(4)(a) Factory Testing

You must provide the documentation from the original cable manufacturer for the factory testing and of compliance with the fiber specifications as listed in the Fiber Characteristics Table. Before shipment, but while on the shipping reel, 100 percent of all fibers must be tested for attenuation. Test results must be recorded and dated. Copies of the results must be (1) maintained on file by the manufacturer with a file identification number for a minimum of seven years, (2) attached to the cable reel in a waterproof pouch, and (3) You must provide a copy to the Engineer. Copies of the test results must also be filed with the copy accompanying the shipping reel in a separate weather proof envelope.

86-2.19A(4)(b) Arrival on Site

Physically inspect the cable and reel on delivery.

Measure the attenuation for 100 percent of the fibers to confirm that the cable meets requirements. Singlemode fibers must be tested at 1310 nm and 1550 nm after arrival on site. Attenuation readings in one direction must be recorded on the cable data sheet.

Test results must be recorded, dated, compared to the detailed factory test results documents and submitted to the Engineer.

Attenuation deviations from the shipping records of greater than 5 percent must be brought to the attention of the Engineer. The cable must not be installed until completion of this test sequence and the Engineer provides written approval.

The failure of any single fiber in the cable to comply with the special provisions is cause for rejection of the entire reel.

If the test results are unsatisfactory, the reel of fiber optic cable must be considered unacceptable and all records corresponding to that reel of cable must be marked accordingly. Replace the unsatisfactory reels of cable with new reels of cable at your expense. Test the new reels of cable to demonstrate acceptability. Submit copies of the test results to the Engineer.

Allow 5 working days for the Engineer to review the "arrival on site test" results and notify you of the results of the review.

86-2.19A(4)(c) After Cable Installation

After the fiber optic cable has been pulled but before breakout and termination, test 100 percent of all the fibers with an OTDR for attenuation.

Singlemode fibers must be tested at 1310 nm and 1550 nm after cable installation. Attenuation readings for each direction must be recorded on the cable data sheet.

Test results must be recorded, dated, and compared to the detailed test procedures documents at the factory. Submit copies of traces and test results to the Engineer.

If the OTDR test results are unsatisfactory, the F/O cable segment will be unacceptable. Replace the unsatisfactory segment of cable with a new segment, without additional splices, at your expense. Test the new segment of cable to demonstrate acceptability. Submit copies of the test results to the Engineer.

Allow 10 working days for the Engineer to review the "after cable installation test" results and notify you of the results of the review.

86-2.19A(4)(d) Outdoor Splices

At the conclusion of all outdoor splices at one location, and before they are enclosed and sealed, test all splices with the OTDR, in both directions. Splices in segments must be tested at 1310 nm and at 1550 nm. Individual fusion splice losses must not exceed 0.07 dB. Measurement results must be recorded, dated, validated by the OTDR trace printout and filed with the records of the respective cable runs. Submit copies of traces and test results to the Engineer. If the OTDR test results are unsatisfactory, the splice is unacceptable. Replace the unsatisfactory splice at the your expense. Test the new splice to demonstrate acceptability. Submit copies of the test results to the Engineer.

86-2.19A(4)(e) Passive Interconnect Package Testing and Documentation

All the components of the passive interconnect package (FDUs, pigtails, jumpers, couplers and splice trays as shown on the plans and in the special provisions) must comprise a unit from a manufacturer who is regularly engaged in the production of the fiber optic components.

In developing the passive interconnect package, each SC termination (pigtail or jumper) must be tested for insertion attenuation loss with the use of an optical power meter and light source. In addition, all singlemode terminations must be tested for return reflection loss. These values must meet the loss requirements specified earlier and must be recorded on a tag attached to the pigtail or jumper.

Once assembly is complete, the manufacturer must visually verify that all tagging, including loss values, is complete. Then as a final quality control measure, the manufacturer must do an "end to end" optical power meter/light source test from pigtail end to jumper lead end to assure continuity and overall attenuation loss values.

The final test results must be recorded, along with previous individual component values, on a special form assigned to each FDU. The completed form must be dated and signed by the Manufacturer's Quality Control supervisor. One copy of this form will be attached in a plastic envelope to the assembled FDU unit. Copies will be provided separately to you and to the Engineer, and must be also be maintained on file by the manufacturer or supplier.

86-2.19A(4)(f) System Verification at Completion

Contractor must test all fiber optic cables from Hub 3 (NB-5/Avery Parkway) to field elements.

OTDR Testing. - Once the passive cabling system has been installed and is ready for activation, test 100 percent of the fiber links with the OTDR for attenuation. Print out must include at least link number, fiber color, buffer color and cable number. Test results must be recorded, dated, compared and filed with previous copies. Submit a hard copy printout and a electronic copy of the traces and test results along with a licensed copy of the associated software on a Windows XP PC compatible CD to the Engineer. If the OTDR test results are unsatisfactory, replace the link at your expense. Test the new link to demonstrate acceptability. Submit copies of the test results to the Engineer.

Power Meter and Light Source. - At the conclusion of the final OTDR testing, test 100 percent of all fiber links end to end, with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. Conduct these tests in both directions. Test results must be recorded, compared and proven to be within the design link loss budgets, and filed with the other recordings of the same links. Submit copies of the test results to the Engineer.

Link Loss Budget Worksheet. - The Link Loss Budget Worksheet shown in Appendix A must be completed for 100 percent of all links in the fiber optic system, using the data gathered during cable verification. Include the completed worksheets as part of the system documentation.

Test Failures. - If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the fiber optic link will not be accepted. Replace the unsatisfactory segments of cable or splices with a new segment of cable or splice at your expense. The OTDR testing, power meter and light source testing and Link Loss Budget Worksheet must be completed for the repaired link to determine acceptability. Submit copies of the test results to the Engineer. The removal and replacement of a segment of cable must be interpreted as the removal and replacement of a single contiguous length of cable connecting two splices, two connectors or one splice and one connector. The removal of only the small section containing the failure and therefore introducing new unplanned splices, will not be allowed.

APPENDIX A

Link Loss Budget Worksheet

Contract No. _____ Contractor: _____

Approved by Caltrans: _____

Date: _____ Operator: _____

Link Number: _____ Fiber Color: _____

Buffer Color: _____ Cable No.: _____

Test Wavelength (Circle one): 1310 1550

Expected Location of fiber ends: End 1: _____ End 2: _____

OTDR Test Results: Forward Loss: _____ dB Reverse Loss: _____ dB Average Loss: _____ dB		1A 1B 1C
Power Meter and Light Source Test Results: Forward Loss: _____ dB Reverse Loss: _____ dB Average Loss [(2A + 2B)/2]: _____ dB		2A 2B 2C
Calculated Fiber Loss: Length of the link (from OTDR): _____ km Allowed loss per km of fiber: 0.4 dB/km Total Allowed Loss due to the fiber (3A * 3B): _____ dB		3A 3B 3C
Calculated Splice Loss: Number of Splices in the Link: _____ Allowed Link Loss per Splice: 0.07 dB Total Allowed Loss due to Splices (4A * 4B): _____ dB		4A 4B 4C
Calculated Link Loss: Connector Loss: 0.9 dB Total Link Loss (5A + 3C + 4C): _____ dB		5A 5B
Cable Verification: Compare Power Meter Average Loss to Calculated Link Loss (2C - 5B): If the value of 6A is greater than zero, the link has failed the Test. See "Test Failures" in these special provisions.	_____ dB	6A

 To Be Completed by Caltrans:

Resident Engineer's Signature: _____

Cable Link Accepted: _____

86-2.19A(4)(g) Warranty

Furnish a 2-year replacement warranty from the manufacturer of Edge Ethernet Switch (EES) against defects in materials and workmanship or failures. The effective date of the warranty is the date of acceptance of the installation. Submit all warranty documentation before installation.

Replacement EES must be furnished within 10 days of receipt of a failed unit. The Department does not pay for replacement.

Deliver replacement EES to Caltrans Maintenance Electrical Maintenance Yard at: 6641 Marine Way, Irvine CA 92618

86-2.19B Materials**86-2.19B(1) Fiber Optic Outside Plant Cable****86-2.19B(1)(a) General**

Each fiber optic outside plant cable (FOOP) for this project must be all dielectric, non-gel water blocking materials, duct type, with loose buffer tubes and must conform to the special provisions. Cables with singlemode fibers must contain singlemode (SM) dual-window (1310 nm and 1550 nm) fibers in the quantities shown below and on the plans.

Type	Cable
Type A cable	36 SM fibers
Type B cable	72 SM fibers
Type C cable	72 SM fibers
Type D cable	12 SM fibers

The optical fibers must be contained within loose buffer tubes. The loose buffer tubes must be stranded around an all dielectric central member. Aramid yarn or fiberglass must be used as a primary strength member, and a polyethylene outside jacket must provide for overall protection.

All fiber optic (F/O) cable on this project must be from the same manufacturer, who is regularly engaged in the production of this material.

The cable must comply with all the requirements of RUS-Chapter XVII, Title 7, Section 1755.900, 1755.901 and 1755.902 and these special provisions.

86-2.19B(1)(b) Cable Components

Each optical fiber must be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube must be usable fibers, and must be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications. The required fiber grade SM must reflect the maximum individual fiber attenuation, to guarantee the required performance of each and every fiber in the cable. The coating must be a dual layered, UV cured acrylate. The coating must be mechanically or chemically strippable without damaging the fiber. The cable must comply with the optical and mechanical requirements over an operating temperature range from -40 to +70 °C. The cable must be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (from -40 to +70 °C) for singlemode fiber must not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km. The singlemode fiber measurement is made at 1550 nm. For all fibers the attenuation specification must be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Singlemode fibers within the finished cable must meet the requirements in the following table:

Parameter	Singlemode
Type	Step Index
Core diameter	8.3 μm (nominal)
Cladding diameter	125 μm ± 1.0 μm
Core to Cladding Offset	$\leq 1.0 \mu\text{m}$
Coating Diameter	250 μm ± 15 μm
Cladding Non-circularity defined as: [1-(Min cladding Dia \div Max cladding Dia.)] $\times 100$	≤ 2.0 percent
Proof/Tensile Test	345 MPa, Min
Attenuation: (-40 to +70 °C) @1310 nm @1550 nm	≤ 0.4 dB/km ≤ 0.3 dB/km
Attenuation at the Water Peak	≤ 2.1 dB/km @ 1383 ± 3 nm
Chromatic Dispersion: Zero Dispersion Wavelength Zero Dispersion Slope	1301.5 to 1321.5 nm ≤ 0.092 ps/(nm ² *km)
Maximum Dispersion: <18 ps/(nm*km) for 1550 nm	≤ 3.3 ps/(nm*km) for 1285 – 1330 nm
Cut-Off Wavelength	<1260 nm
Mode Field Diameter (Petermann II) 10.5 ± 1.0 μm at 1550 nm	9.3 ± 0.5 μm at 1300 nm

86-2.19B(1)(c) Fiber Color Coding

Optical fibers must be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	7. Red (RD)
2. Orange (OR)	8. Black (BK)
3. Green (GR)	9. Yellow (YL)
4. Brown (BR)	10. Violet (VL)
5. Slate (SL)	11. Rose (RS)
6. White (WT)	12. Aqua (AQ)

The colors must be targeted in accordance with the Munsell color shades and must meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

Buffer tubes containing fibers must also be color coded with distinct and recognizable colors according to the same table listed above for fibers.

The color formulation must be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It must not fade or smear or be susceptible to migration and it must not affect the transmission characteristics of the optical fibers and must not cause fibers to stick together.

86-2.19B(1)(d) Cable Construction

The fiber optic cable must include the following components:

1. Buffer tubes
2. Central member
3. Filler rods
4. Stranding
5. Core and cable flooding
6. Ripcord
7. Outer jacket

Buffer Tubes. - Loose buffer tubes must provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers must be loose or suspended within the tubes and must not adhere to the inside of the tube. Each buffer tube must contain 6 or 12 fibers.

The loose buffer tubes must be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material must be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube must have a non-gel water-blocking material used to prevent water intrusion and migration. The filling compound must be non-toxic and dermatologically safe to exposed skin. It must be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound must be free from dirt and foreign matter and must be readily removable with conventional nontoxic solvents.

Buffer tubes must be stranded around a central member by a method that will prevent stress on the fibers when the cable jacket is placed under strain, such as the reverse oscillation stranding process.

Central Member. - The central member which functions as an anti-buckling element must be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. A linear overcoat of low density polyethylene must be applied to the central member to achieve the optimum diameter to provide the proper spacing between buffer tubes during stranding.

Filler Rods. - Filler rods may be included in the cable to lend symmetry to the cable cross-section where needed. Filler rods must be solid medium or high density polyethylene. The diameter of filler rods must be the same as the outer diameter of the buffer tubes.

Stranding. - Completed buffer tubes must be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable must meet mechanical, environmental and performance specifications. A polyester binding must be applied over the stranded buffer tubes to hold them in place. Binders must be applied using tension sufficient to secure the buffer tubes to the central member without crushing the buffer tubes. The binders must be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

Core and Cable Flooding. - The cable core interstices must be filled with a polyolefin based compound to prevent water ingress and migration. The flooding compound must be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The compound must also be nontoxic, dermatologically safe and compatible with all other cable components.

Ripcord. - The cable must contain at least one ripcord under the jacket for easy sheath removal.

Outer Jacket. - The jacket must be free of holes, splits, and blisters and must be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 40.0 ± 3 mil. Jacketing material must be applied directly over the tensile strength members and flooding compound and must not adhere to the aramid strength material. The polyethylene must contain carbon black to provide ultraviolet light protection and must not promote the growth of fungus.

The jacket or sheath must have clear, distinctive and permanent markings showing the manufacturer's name, the words "Optical Cable", the number of fibers, "SM", year of manufacture, and sequential measurement markings every 3 feet. The actual length of the cable must be within -0/+1 percent of the length marking. The marking must be in a contrasting color to the cable jacket. The height of the marking must be approximately 0.1-inch.

86-2.19B(1)(e) Functional Requirements

The F/O cable must withstand water penetration when tested with a one meter static head or equivalent continuous pressure applied at one end of a 3-foot length of filled cable for one hour. No water must leak through the open cable end. Testing must be done in accordance with ANSI/EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable must be tested in accordance with ANSI/EIA/TIA-455-81A "Compound Flow (Drip) Test for Filled Fiber Optic Cable". The test sample must be prepared in accordance with Method A. No preconditioning period must be conducted. The cable must exhibit no flow (drip or leak) at 70°C as defined in the test method.

Crush resistance of the finished F/O cables must be 220 N/cm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables." The average increase in attenuation for the fibers must be ≤ 0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. The cable must not exhibit any measurable increase in attenuation after removal of load. Testing must be in accordance with EIA-455-41 (FOTP-41), except that the load must be applied at the rate from 0.10 to 0.75 inch per minute and maintained for 10 minutes.

The cable must withstand 25 cycles of mechanical flexing at a rate of 30 ± 1 cycles/minute. The average increase in attenuation for the fibers must be ≤ 0.20 dB at 1550 nm (singlemode) at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification constitutes failure. The test must be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable must be tested in accordance with Test Conditions I and II of (FOTP-104).

The cable must withstand 20 impact cycles. The average increase in attenuation for the fibers must be ≤ 0.20 dB at 1550 nm (singlemode). The cable jacket must not exhibit evidence of cracking or splitting. The test must be conducted in accordance with EIA-455-25 (FOTP-25), "Impact Testing of Fiber Optic Cables and Cable Assemblies."

The finished cable must withstand a tensile load of 610 pounds without exhibiting an average increase in attenuation of greater than 0.20 dB. The test must be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load must be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

86-2.19B(1)(f) Packaging and Shipping Requirements

The completed cable must be packaged for shipment on reels. The cable must be wrapped in a weather and temperature resistant covering. Both ends of the cable must be sealed to prevent the ingress of moisture.

Each end of the cable must be securely fastened to the reel to prevent the cable from coming loose during transit. Ten feet of cable length on each end of the cable must be accessible for testing.

Each cable reel must have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, your name, the contract number, and the reel number. A shipping record must also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel must be at least thirty times the diameter of the cable. The F/O cable must be in one continuous length per reel with no factory splices in the fiber. Each reel must be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

86-2.19B(2) Fiber Distribution Unit

You must install all related equipment to interface the fiber distribution unit (FDU) to the incoming fiber optic communication cables.

The units must accommodate the fiber optic cable described in the special provisions.

Type A FDU must accommodate termination of not less than 6 individual fibers.

Type B FDU must accommodate termination of not less than 12 individual fibers.

Type C FDU must accommodate termination of not less than 24 individual fibers.

Type D FDU must accommodate termination of not less than 48 individual fibers.

Type E FDU must accommodate termination of not less than 60 individual fibers.

Type F FDU must accommodate termination of not less than 72 individual fibers.

Type G FDU must accommodate termination of not less than 144 individual fibers.

The FDU must provide interconnect capability and must include the following:

1. A patch panel to terminate singlemode fiber with SC type connector feed through adapters.
2. Storage for splice trays.
3. A slide out metal shelf for the storage of 6 spare jumpers each measuring 36-inches long

The patch panel must be hinged to provide easy access and maintenance. Brackets must be provided to spool the incoming fiber a minimum of three turns, each turn of not less than 10 inches in length, before separating out individual fibers to the splice tray. Strain relief must be provided for the incoming fiber optic cable. All fibers must be terminated and identified in the FDU.

Splices shall conform to the provisions in Section 86-2.09, "Wiring," of the Standard Specifications.

86-2.19B(3) Fiber Optic Splice Enclosure

The fiber optic field splices must be enclosed in splice enclosures which must be complete with splice organizer trays, brackets, clips, cable ties, and sealant, as needed. The splice enclosure must be suitable for a direct burial or pull box application. Manufacturer's installations must be supplied to the Engineer prior to the installation of any splice enclosures. Location of the splice enclosures must be where a splice is required as shown on the plans, designated by the Engineer, or described in the special provisions.

The splice enclosure must conform to the following specifications:

1. Non-filled thermoplastic case
2. Rodent proof, water proof, re-enterable and moisture proof
3. Expandable from 2 cables per end to 8 cables per end by using adapter plates
4. Cable entry ports must accommodate 0.25-inch to 1-inch diameter cables
5. Multiple grounding straps
6. Accommodate up to 8 splice trays
7. Suitable for "butt" or "through" cable entry configurations
8. Place no stress on finished splices within the splice trays

The size of the enclosure must allow all the fibers of the largest fiber optic cable to be spliced to a second cable of the same size, plus 12 additional pigtails. The enclosure must fit into the fiber optic splice vault and must leave sufficient space for routing of the fiber optic communication cables, without exceeding the minimum bending radius of any cable.

All materials in the enclosures must be nonreactive and must not support galvanic cell action.

Adequate splice trays must be specified to splice all fibers of the largest fiber optic cable, plus 12 pigtails.

The enclosure must be sealed using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices. Encapsulant must be injected between the inner and outer enclosures.

Care must be taken at the cable entry points to ensure a tight salt resistant and waterproof seal is made which will not leak upon aging. It is acceptable to have multiple pigtails enter the fiber splice enclosure through one hole as long as all spaces between the cables are adequately sealed.

Bolt the splice enclosure to the side wall of the fiber optic vault.

The fiber optic splice enclosure must be suitable for a temperature range from 32 to 104°F.

Each splice must be individually mounted and mechanically protected in the splice tray.

You must install the fiber splice enclosure in the fiber optic vaults where splicing is required. The fiber optic splice enclosures must be securely fastened to the fiber optic vault or wall using standard hardware as recommended by the enclosure manufacturer.

You must provide all mounting hardware required to securely mount the enclosures.

86-2.19B(4) Splice Tray

Splice trays must accommodate a minimum of 12 fusion splices and must allow for a minimum bend radius of 1.75 inch. Individual fibers must be looped one full turn within the splice tray to allow for future splicing. No stress is to be applied on the fiber when it is located in its final position. Buffer tubes must be secured near the entrance of the splice tray to reduce the chance of an inadvertent tug on the pigtail and damage to the fiber. The splice tray cover must be transparent.

Splice trays in the splice enclosure must conform to the following:

1. Accommodate up to 24 fusion splices
2. Place no stress on completed splices within the tray
3. Accommodate "butt" or "feed through" splicing applications.
4. Stackable with a transparent snap-on hinge cover
5. Buffer tubes securable with channel straps
6. Contain fiber retention strips.
7. Must be able to accommodate a fusion splice with the addition of an alternative splice holder
8. Must be labeled after splicing is completed.

Only one single splice tray may be secured by a bolt through the center of the tray in the fiber termination unit. Multiple trays must be securely held in place as per the manufacturer's recommendation.

86-2.19B(5) Passive Cable Assemblies And Components

The F/O cable assemblies and components must be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies must be best quality and non-corroding. All components or assemblies of the same type must be from the same manufacturer.

86-2.19B(6) Fiber Optic Cable Assemblies and Pigtails

Cable assemblies (jumpers and pigtails) must be products of the same manufacturer. The cable used for cable assemblies must be made of fiber meeting the performance requirements for the F/O cable being connected.

Pigtails must be of simplex (one fiber) construction, in 900 μ m tight buffer form with a PVC jacket with manufacturer identification information, and a nominal outer jacket diameter of 0.12 inch. Single mode simplex cable jackets must be yellow in color. All pigtails must be factory terminated and tested and at least 3 feet in length.

Jumpers may be of simplex or duplex design. Duplex jumpers must be of duplex round cable construction, and must not have zipcord (siamese) construction. All jumpers must be at least 6.6 feet in length, sufficient to avoid stress and allow orderly routing.

The outer jacket of duplex jumpers must be colored according to the single mode color (yellow) specified above. The 2 inner simplex jackets must be contrasting colors to provide easy visual identification for polarity.

86-2.19B(7) Fiber Optic Cable Connectors

Connectors must be of the ceramic ferrule SC type for SM. Indoor SC connector body housings must be either nickel plated zinc or glass reinforced polymer construction. Outdoor SC connector body housing must be glass reinforced polymer.

The associated coupler must be of the same material as the connector housing.

All F/O connectors must be the 0.1 inch SC connector ferrule type with Zirconia Ceramic material with a PC (Physical Contact) pre-radiused tip.

The connector operating temperature range must be -40 to 158 degrees F. Insertion loss must not exceed 0.4 dB for single mode, and the return reflection loss on single mode connectors must be at least 55 dB. Connection durability must be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21).

All terminations must provide a minimum 50 lbf pull out strength. Factory test results must be documented and submitted before installing any of the connectors. Single mode connectors must have a yellow color on the body and/or boot that renders them easily identifiable.

Field terminations must be limited to splicing of adjoining cable ends and/or cables to SC pigtails.

86-2.19B(8) Splice Vault

Splice vaults shall be 60 inch (L) x 30 inch (W) x 30 inch (D) nominal inside dimensions and shall conform to the provisions in Section 86-2.06, "Pull Boxes," of the Standard Specifications and these special provisions. Covers shall be in two-piece torsion assisted section. Hold down bolts or cap screws and nuts shall be brass, stainless steel or other non-corroding metal. Cover portions shall have inset lifting pull slots. Cover markings shall be "TOS COMMUNICATION" on individual cover section. Enclosures, covers and extensions shall be concrete gray color. Vault and covers may be constructed of reinforced portland cement concrete or of non-PCC material.

Non-PCC vault and covers shall be of sufficient rigidity that when a 100 lbf concentrated force is applied perpendicularly to the midpoint of one of the long sides at the top, while the opposite long side is supported by a rigid surface, it shall be possible to remove the cover without the use of tools. When a vertical force of 1500 lbf is applied, through a 0.5 inch by 3 inch by 6 inch steel plate, to a non-PCC cover in place on a splice vault, the cover shall not fail and shall not deflect more than 0.25 inch.

Splice vaults shall be installed as detailed and where shown on the plans. Splice vaults and covers shall have an AASHTO HS 20-44 rating where shown on the plans, except in areas protected from vehicular traffic, may be rated for AASHTO H5 loads (25 percent of HS 20-44).

86-2.19B(9) Innerduct

Innerduct shall be installed wherever fiber optic (F/O) cable is installed in conduit. Four innerducts shall be installed in one each Size 4 inch conduit. Each fiber optic cable shall be installed in its own innerduct.

Copper cable shall not be mixed with F/O cable within the same innerduct.

Innerduct shall consist of an extruded flexible, smooth corrugated or ribbed high density polyethylene (HDPE) tubing installed inside electrical conduit. The fiber optic cable shall be installed in the tubing. Innerduct within a conduit run shall be continuous without splices or joints.

Unless otherwise shown on the plans, innerduct for new conduit shall be nominal 1.0 inch inside diameter with wall thickness of 0.0906 inch \pm 0.003 inch, and shall meet the following requirements:

- A. Polyethylene for innerduct shall have a density of 59.6187 lb/ft³ \pm 0.3121 lb/in³ (ASTM Designation: D 1505) and shall conform to the applicable requirements of ASTM Designation: D 3485, D 3035, D 2239, and D 2447, and the applicable requirements of NEMA TC7 and TC2. Tensile yield strength shall be 3300 psi minimum in accordance with the requirements in ASTM Designation: D 638.
- B. The polyethylene forming each innerduct shall be color coded in accordance with the cable type that it contains as follows:
 - 1. Type A – black
 - 2. Type B – orange
 - 3. Type C – yellow
 - 4. Type D – blue

The innerducts shall be shipped on reels marked with the manufacturer, the contract number, and the size and length of the innerduct. The product on reels shall be covered with aluminized material to protect colors from UV deterioration during shipment and storage.

Installation procedures shall conform to the procedures specified by the innerduct manufacturer.

86-2.19B(10) Innerduct Sealing Plugs

Except as otherwise noted, all fiber optic cable conduits and empty innerducts must have their ends sealed with commercial preformed plugs which prevent the passage of gas, dust and water into these conduits and their included innerducts. Sealing plugs must be installed within each splice vault, pull box, cabinet, or building.

Sealing plugs shall be removable and reusable. Plugs sealing, conductor or cable shall be the split type that permits installation or removal without removing conductors or cables.

Sealing plugs that seal between the 4 inch fiber optic conduits shall seal the conduit simultaneously with one self contained assembly having an adjustable resilient filler of polyurethane elastomer clamped between backing ends and compressed with stainless steel hardware. Sealing plugs shall be capable of withstanding a pressure of 5 psi.

Sealing plugs that seal between the 4 inch fiber optic conduits shall seal the conduit simultaneously with one self contained assembly having an adjustable resilient filler of polyurethane elastomer clamped between backing ends and compressed with stainless steel hardware. Sealing plugs shall be capable of withstanding a pressure of 5 psi.

Sealing plugs used to seal 4 inch fiber optic conduit and innerduct must be capable of withstanding a pressure of 5 psi.

A sealing plug that seals an empty fiber optic conduit or innerduct must have an eye or other type of capturing device (on the side of the plug that enters the conduit) to attach onto the pull tape, so the pull tape will be easily accessible when the plug is removed.

86-2.19B(11) Edge Ethernet Switch (EES)

The Edge Ethernet Switch shall be environmentally hardened and intended for industrial applications. The switch shall meet, at a minimum, the following requirements:

1. A minimum of two (2) 100BASE-FX ports (transmit and receive) capable of transmitting Ethernet data at 100 Mb/s over singlemode fiber, full duplex (SFP ports with LC connectors if possible)
2. A minimum of two (2) 1 G ports (transmit and receive) capable of transmitting Ethernet data at 1000 Mb/s over singlemode fiber, full duplex.
3. A minimum of six (6) autosensing 100BASE-TX / 10BASE-T 8P8C modular ports capable of transmitting Ethernet data at 10 or 100 Mb/s, full duplex.
4. Switch shall be capable of operating using an input voltage of 120VAC at 60Hz with a maximum power consumption of 20 watts,
5. Switch ports shall comply with the following standards:
 - 5.1. IEEE 802.3 10Base-T
 - 5.2. IEEE 802.3u 100Base-TX
 - 5.3. IEEE 802.3u 100Base-FX
 - 5.4. IEEE 802.3ab 1000Base-T
 - 5.5. IEEE 802.3z 1000Base-SX and 1000Base-LX
 - 5.6. IEEE 802.1P priority queuing
 - 5.7. IEEE 802.3X flow control
6. Wire speed switching on all ports simultaneously, non-blocking.
7. IEEE 802.1Q VLAN Tagging 4 port trunking groups with up to 2~4 ports per group with support for 256 VLANs
8. Meets Bellcore GR-63-CORE vibration and shock specifications for NEBS Level III compliance
9. Operating temperature = -40 to +74 degrees Celsius
10. Relative humidity = 10% - 90%, non-condensing
11. Emissions meet FCC Part 15, Class A
12. Packet Filtering and Port Security Destination MAC
13. IEEE 802.1p QoS Classification based on: Port based priority VLAN Priority field in VLAN tagged frame DS/TOS field in IP packet UDP/TCP logical ports
14. IEEE 802.1w Rapid Spanning Tree Algorithm
15. IP Multicast Filtering through IGMP Snooping
16. Support Telnet, SNMP v1 & v2c, v3, RMON, Web Browser, Port Mirroring (RFC 2819, TFTP, FTP and CLI management tools
17. Management and configuration shall be able to be performed through an integrated web interface
18. Support remote reset and remote management
19. Support remote turn on/off of 10/100 Base-T ports

All connectors, indicators, and replaceable components shall be permanently marked and traceable to the supplied documentation, including schematics and parts list. The external markings shall include the product function name, model number, serial number, and manufacturer's name.

The Contractor shall provide Category 5E cable to connect the field devices (s) to the Edge Ethernet switch. All Cat-5E cables shall be a minimum of 10 feet long, and suited to the field cabinet layout and environment. The Cat-5E jumpers shall be external grade cable with field-rated 8P8C modular connectors, and shall meet all TIA Cat 5E standards (TIA-568).

The Edge Ethernet Switch shall provide the Ethernet interconnections that are necessary for all dedicated Ethernet segments, shared workgroup Ethernet segments, and

Ethernet segments virtually extended from the field locations and within the TMC. The Edge Ethernet Switch provides the mechanism for distributing IP-encoded video to workstations and IP-decoders.

The existing core switch at TMC (model 6506 E with Supervisor 720 module) shall be fully integrated with the Edge Ethernet switches and the existing hub Ethernet switches at Hub #2 and at Hub #6 (model 4507R with Supervisor IV modules) with all system functions for new VLANs as required by these requirements and the Caltrans Engineer.

The Edge Ethernet switch shall be warranted for a period of three (3) years. The warranty shall guarantee the switch to be free from defects from assembly, fabrication, and materials. The warranty shall be provided in writing. If the normal manufacturer's warranty extends for a longer period, the switch shall be warranted for that period. The warranty period shall be measured from the date of acceptance and not from date of shipment or receipt.

Switches or replaceable components found to be defective during the warranty period shall be replaced free of charge by the manufacturer. The replacement of defective switches or replaceable components shall occur within ten (10) calendar days of notification. Notification will be in the form of an electronic mail or official letter.

The manufacturer shall also provide technical support coverage for all equipment and software furnished. This support shall as a minimum, include the followings:

- A. Software and firmware upgrades;
- B. Software patches;
- C. Business hours coverage via telephone and email.

Technical support shall be included in the warranty and the coverage period shall be the same as the duration of the warranty. No additional payment shall be required.

86-2.19C Construction

86-2.19C(1) Fiber Optic Cable Terminations

Fiber optic cable must continue within the conduit to the designated termination point for cable termination. All components must be the size and type required for the specified fiber. Fiber optic cable terminations may take place in several locations such as TOS cabinets and camera sites.

At the FDU, the cable jacket of the fiber optic cable, must be removed exposing the filler rods, and buffer tubes. The exposed length of the buffer tubes must be at least the length recommended by the FDU manufacturer which allows the tubes to be secured to the splice trays. The remainder of the tubes must be removed to expose sufficient length of the fibers in order to properly install on the splice tray, as described in "Splicing" in the special provisions.

86-2.19C(2) Installation

Installation procedures must conform to the cable manufacturer's procedures for the specific cable being installed. Mechanical aids may be used, provided that a tension measuring device is placed in tension to the end of the cable, and the allowable tension does not exceed 500 lbf or the manufacturer's recommended pulling tension whichever is less. A calibrated break-away feature must be employed to work in tandem with the tension measuring device and limit excessive tension by disengaging when a set tension is exceeded.

When mechanical aids are proposed for use in pulling fiber optic cable, submit information on the proposed methods and the conditions for use. The submittal must conform to the information submittal requirements, including the time frames for review and approval, as described in "Air Blown Method," of the special provisions.

Except when the "Air Blown Method" is used, FO cable must be installed using a cable pulling lubricant recommended by the FO cable or the conduit manufacturer and a non-abrasive pull tape.

Splices must be limited to locations as shown on the plans and as directed by the Engineer.

During cable installation, the bend radius must be maintained at not less than twenty times the outside diameter of the cable. The stress relief component must be installed at the entrance to the FDU as recommended by the manufacturer. The cable grips for installing the fiber optic cable must have a ball bearing swivel to prevent the cable from twisting during installation. The final installed bend radius of the fiber optic cable must be no less than ten times the outside diameter of the cable.

FO cable must be installed without splices except where specifically allowed on the plans. If splice locations are not shown on the plans, splicing must be limited to one cable splice every 3.5 miles. Any midspan access splice or FDU termination must involve only those fibers being spliced as shown on the plans. Cable splices must be located in splice enclosures, installed in splice vaults shown on the plans. A minimum of 65 feet of slack must be specified for each F/O cable at each splice vault. A minimum of 50 feet of slack must be provided at each vault without a cable splice. Slack must be divided equally on each side of the F/O splice enclosure.

Only one FO cable must be installed in each conduit unless shown or provided otherwise.

86-2.19C(3) Labeling

Label fiber optic cables in a permanent and consistent manner. Labels must be made of a material designed for permanent labeling. Labels must be mechanically marked with permanent ink on non-metal type labels, or embossed lettering on metal type labels; hand written labels must not be used. Metal tags must be constructed of stainless steel. Metal tags are required for use on fiber optic cables. Use of non-metal label materials must be only as approved by the Engineer. At vaults and other underground locations, all labels and imprinting must be weatherproof. Affix labels per the manufacturer's recommendations in a manner that will not cause damage to the cable or fiber.

86-2.19C(3)(a) Cable Identification

Identification used for labeling of the fiber optic cables must be as shown on the plans.

86-2.19C(3)(b) Label Placement

Fiber Optic Cables. - All cables must be labeled at all terminations, even if no connections or splices are made, and at fiber optic vault entrance and exit points (where splicing is required at the vault).

Cable to Cable Splices. - The cable must be labeled at entry to splice enclosure.

Cable to Fiber Distribution Units. - The cable must be labeled at entry to the FDU. Only one cable must be terminated in each FDU. The FDU must be labeled on the face of the FDU. Individual connections must be clearly marked on the face of the FDU in the designated area as directed by the Engineer.

Fibers. - Fiber labels must be placed next to the connectors of the individual fibers.

Jumpers. - Equipment to FDU Jumpers must be labeled as to the equipment type connected and must be labeled at both ends. FDU to FDU jumpers must be labeled with the cable ID-TYPE-START-END information at each end.

86-2.19C(4) Fiber Optic Splicing

Unless otherwise allowed, FO cable splices must be fusion type. The mean splice loss must not exceed 0.07 dB per splice. The mean splice loss must be obtained by measuring the loss through the splice in both directions and then averaging the resultant values.

The field splices must connect the fibers of the two FO cable lengths together. These splices must be placed in a splice tray and these splice tray(s) must then be placed in the splice enclosure.

Fibers of the same buffer tube, but not being spliced must be placed in a splice tray alongside spliced fibers. Buffer tubes that do not require enclosed fibers to be spliced must not be disturbed and placed in the splice enclosure.

The termination splices must connect the FO cable span ends with pigtails. The termination splices must be placed in a splice tray and the splice tray(s) must then be placed in the fiber distribution unit (FDU). The individual fibers must be looped one full turn within the splice tray to avoid micro bending. A 2-inch minimum bend radius must be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber must be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fibers in the splice tray must be such that there is no discernible tensile force on the optical fiber.

All splices must be protected with a metal reinforced thermal shrink sleeve.

All fiber optic cables must be labeled in the splice tray. Pigtail ends must also be labeled to identify the destination of the fiber.

86-2.19C(5) Colored Concrete Backfill

Concrete backfill for the installation of conduits that will contain F/O cable must be a medium to dark, red color to clearly distinguish the concrete backfill from other concrete and soil. The concrete must be pigmented by the addition of commercial quality cement pigment to the concrete mix. The concrete backfill must comply with the specifications for minor concrete.

The size of the aggregate shall not be larger than 0.375 inch.

86-2.19C(6) Warning Tape

Warning tape shall be furnished, installed and placed in the trench over conduits to receive communication fiber optic cable, as shown on the plans.

The warning tape shall have:

DESCRIPTION	PARAMETERS
Thickness	not be less than 4 mil thick
Width	4 inch
Material	pigmented polyolefin film
Tensile strength	minimum of 2800 PSI
Elongation	minimum of 500 percent elongation before breakage
Printed Text height	0.75 inch
Message background color	bright orange color background
Message statement	CAUTION: BURIED FIBER OPTIC CABLE - CALTRANS (949) 936-3400
Message spacing intervals	approximately 36 inch

The printed warning must not be removed by the normal handling and burial of the tape and shall be rated to last the service life of the tape.

The construction of the warning tape shall be such that it will not delaminate when it is wet. It must be resistant to insects, acid, alkaline and other corrosive elements in the soil.

Warning tape shall be manufactured by Condux International, Inc.; Allen System, Inc.; Reef Industries, Inc. or equal.

86-2.19C(7) Tracer Wire

Tracer wire shall be provided and placed in the trench over PVC conduits containing fiber optic cable. The wire shall be placed 2 inches above the uppermost conduit in the trench or secured to the top of the uppermost conduit in the trench.

Tracer wire shall be No. 8 stranded, minimum, copper conductor with type TW, THW, RHW, or USE insulation. The tracer wire shall form a mechanically and electrically continuous line throughout the length of the trench. Where trenched communication conduit joins metal conduit that has been jacked or drilled, the tracer wire must be bonded to the metal conduit with a brass grounding clamp.

A minimum of 5 feet of slack shall be extended into each pull box and splice vault from each direction. The wires shall be carefully placed so as not to be damaged by backfilling operations.

Conduit entering or exiting a reinforced concrete structure will not require tracer wire to the first pull box or fiber optic splice box. Tracer wire may be spliced at intervals of not less than 500 feet and in pull boxes.

86-2.19D Payment

Not Used.

Add to section 86-3.04:

Cabinet must be Model 334 and consist of a housing (B), a mounting cage 1, and the following listed equipment. The equipment must comply with chapter 6 of TEES.

1. Service panel no. 1
2. Power distribution assembly no. 3
3. Input file (I file)
4. C1 harness
5. Controller and equipment shelves
6. Dual fan assembly with thermostatic control
7. Mechanical armature-type relays
8. Input panel

Before shipping to the job site, submit each 334 cabinet to METS for acceptance testing.

Notify the Engineer when each 334 cabinet is ready for functional testing. Functional testing will be conducted by the Department.

Each power distribution assembly must include the following equipment:

1. Two duplex NEMA 5-15R controller receptacle (rear mount)
2. One 30 A, 1-pole, 120 V(ac) main circuit breaker
3. Three 15 A, 1-pole, 120 V(ac) circuit breaker
4. One duplex GFCI NEMA 15 A, receptacle (front mount)

Furnish 3 shelves as shown. Each shelf must be attached to the tops of 2 supporting angles with 4 screws. Supporting angles must extend from the front to the back rails. The front of the shelf must abut the front member of the mounting cage. Arrange shelves as shown. The angles must be designed to support a minimum of 50 pounds each. The horizontal side of each angle must be a minimum of 3 inches. The angles must be vertically adjustable.

Furnish 3 terminal blocks as shown. Terminal blocks must comply with Chapter 6 of TEES, except the screw size must be 8-32.

Furnish a maintenance manual or a combined maintenance and operation manual for all controller units, auxiliary equipment, vehicle detector sensor units, control units, and amplifiers. Submit manual when the controllers are delivered for testing or, if ordered by the Engineer, before purchasing. The manual must include the following:

1. Specifications
2. Design characteristics
3. General operation theory
4. Function of all controls
5. Troubleshooting procedure (diagnostic routine)
6. Block circuit diagram
7. Geographical layout of components
8. Schematic diagrams
9. List of replaceable component parts with stock numbers

Replace section 86-4.01D(1)(c)(ii) with:

86-4.01D(1)(c)(ii) Warranty

The manufacturer must provide a written warranty against defects in materials and workmanship for LED signal modules for a minimum period of 48 months after installation of LED signal modules. Replacement LED signal modules must be provided within 15 days after receipt of failed LED modules at your expense. The Department pays for shipping the failed modules to you. All warranty documentation must be submitted to the Engineer before installation. Replacement LED signal modules must be delivered to State Maintenance Electrical Shop at Batavia Maintenance Yard, 1808 North Batavia, Orange, CA 91865.

Add to section 86-4.01D(2)(a):

LED signal module must be manufactured for 12-inch circular, 8-inch circular, and arrow sections.

Add to section 86-4:

86-4.06 LIGHT EMITTING DIODE METER ON SIGN

86-4.06A General

86-4.06A(1) Summary

Section 86-4.03J includes specifications for installing LED meter-on in type A modified pedestrian signal.

Comply with section 86-4.03.

86-4.06A(2) Submittals

Before shipping LED signal modules to job site, submit to METS:

1. Delivery form including district number, EA, and contact information
2. List containing all LED signal module serial numbers anticipated for use
3. LED signal modules

Submit warranty documentation before installation.

86-4.06A(3) Quality Control and Assurance

86-4.06A(3)(a) General

Module must be one listed on the Pre-Qualified Products List for LED traffic signals at:

http://www.dot.ca.gov/hq/esc/approved_products_list

The Department will test LED signal module shipments per Normal Sampling Plan ANSI/ASQC Z1.4, Tables for Inspection by Attributes. The Department completes testing within 30 days after delivery to METS. LED signal modules tested or submitted for testing must be representative of typical production units. LED signal modules will be tested under California Test 604. All parameters of the specification may be tested on the modules. LEDs must be spread evenly across the module. Measurements will be performed at the rated operating voltage of 120 V (ac).

After testing, pick up accepted LED signal modules from METS and deliver to the job site.

86-4.06A(3)(b) Warranty

Furnish a 4-year replacement warranty from the manufacturer of the LED signal modules against any defects or failures. The effective date of the warranty is the date of installation. Furnish replacement components within 15 days after receipt of the failed parts. The Department does not pay for the replacement. Deliver replacement LED signal modules to the following department maintenance electrical shop:

District 12 - Caltrans Electrical Maintenance Yard
Batavia Maintenance Yard
1808 North Batavia, Orange, CA 92865

86-4.06B Materials

LED Meter on module must:

1. Be weather tight and connect directly to electrical wiring.
2. Be capable of optical unit replacement.
3. Be AlInGaP technology
4. Be ultra bright type rated for 100,000 hours of continuous operation from -40 to +74 degrees C
5. Each module must provide an average luminous intensity of 1,547 foot-lambert or more throughout the useful life over the operating temperature range.
6. The uniformity ratio of an illuminated symbol must not exceed 4 to 1 between the highest luminance area and the lowest luminance area in the module.
7. The color output of the module must comply with the requirements of Section 5.3 in the ITE Publication: Equipment and Material Standards, Chapter 3 (Pedestrian Traffic Control Signal Indications).
8. 'Meter On' must be lunar white with measured chromatical coordinates of LED module operating over a temperature range of -40 to +74 degrees C is:
 - x: not less than 0.280, nor greater than 0.320
 - y: not less than 1.055X - 0.0128, nor greater than 1.055X +0.0072
9. Be a single, self-contained device, not requiring on-site assembly for installation into standard Type A housing.
10. Module Identification
 - 10.1. Each module must have the manufacturer's name, trademark, model number, serial number, date of manufacture month and year, and lot number as identification permanently marked on the back of the module.
 - 10.2. The following operating characteristics must be permanently marked on the back of the module: rated voltage and rated power in Watts and Volt-Ampere.
11. Maximum power consumption requirements for the LED modules in Watts are:
 - 11.1. 15.0 at 25 degrees C.
 - 11.2. 17.0 at 74 degrees C.

LED Meter on modules must have an operational lifecycle rating of 48 months. During the operational lifecycle, LED signal modules must meet all parameters of this specification.

Individual LEDs must be wired such that a catastrophic loss or failure of one LED will result in loss of not more than 5 percent of the module light output. Failure of an individual LED in a string must not result in the loss of entire string or other indication.

Wiring and terminal block must comply with Section 13.02 of ITE publication, Equipment and Material Standards, Chapter 2, "Vehicle Traffic Control Signal Heads." The LED module must be supplied with spade lugs and 3 secured, color-coded, 3-foot long, 600 V, 20 AWG minimum stranded jacketed copper wires. Wires must comply with NEC, rated for service at +105 degrees C.

LED Meter on module must operate:

1. At a frequency of 60 ± 3 Hz, over a voltage range from 95 to 135 V (ac), without perceptible flicker to the unaided eye. Fluctuations of line voltage must have no visible effect on luminous intensity of the indications. Rated voltage for measurements must be 120 V (ac).
2. Compatible with currently used State controller assemblies, including solid state load switches, flashers, and conflict monitors. Comply with TEES Chapters 3 and 6. If a 20 mA alternating current or less is applied to the unit, the voltage read across the 2 leads must be 15 V (ac) or less.

LED Meter on module on-board circuitry must:

1. Include voltage surge protection to withstand high-repetition noise transients. The voltage surge protection must comply with NEMA Standard TS2, Section 2.1.6.
2. Comply with FCC, Title 47, SubPart B, Section 15 regulations for Class A emission limits for electronic noise.

LED signal module must provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by LED signal module must not exceed 20 percent at an operating temperature of 25 degrees C.

When power is applied to LED signal module, light emission must occur within 90 ms.

Power supply must be integral to the module.

Internal components must be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

Lens and LED signal module material must comply with the ASTM specifications for that material.

Enclosures containing either the power supply or electronic components of LED signal module, except lenses, must be made of UL94VO flame-retardant material.

LED signal module must have prominent and permanent vertical markings for accurate indexing and orientation within the signal housing. Markings must include an up arrow, or the word "UP" or "TOP."

Lenses must have 3/16 inch, minimum thickness, clear acrylic or polycarbonate plastic or 1/8 inch nominal thickness glass fiber reinforced plastic with molded one piece neoprene gasket. Message lettering for "METER" must be "Series C," 4-1/2 inches high with uniform 1/2 inch stroke, and for "ON" must be "Series C," 6 inches high, with uniform one inch stroke. Letters must be clear, transparent or translucent, with black opaque background silk screened on to the second surface of the lens.

86-4.06C Construction

No special tools for installation are allowed.

Add to section 86-5.01A(1):

Loop detector lead-in cable must be Type C.

For Type E detector loops, sides of the slot must be vertical and the minimum radius of the slot entering and leaving the circular part of the loop must be 1-1/2 inches. Slot width must be a maximum of 5/8 inch. Loop wire for circular loops must be Type 2. Slots of circular loops must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

Add to Section 86-5.01:

86-5.01E Closed Circuit Television (CCTV) System

86-5.01E(1) General

Closed circuit television (CCTV) system consists of installing conduit, pull boxes, conductors, cable, Category 5E cable, CCTV camera assembly, CCTV pole, CCTV cabinet, and Video Encoder (VE), all as shown on the plans and specified in the special provisions.

86-5.01E(1)(a) Submittals

A minimum of 10 working days before the scheduled delivery of the closed circuit television camera assembly to the project site, submit:

1. A certificate of compliance certifying that the closed circuit television camera assembly complies with the requirements of the special provisions. The certificate must include a copy of all applicable test reports on the closed circuit television camera assembly.
2. Four sets of documentation containing complete specifications and operation details of each of the components of the CCTV camera assembly.
3. Four copies of the maintenance manuals for the pan and tilt unit.
4. Four sets of wiring diagrams showing wire colors, functions, and pin assignments for connecting these CCTV camera assembly components to each other and to the encoder.
5. Manufacturer's cut sheets or specifications data of CCTV camera cable assemblies, including connectors with strain relief back shells.
6. A copy of the CCTV camera cable assembly testing procedures and manufacturer's test results.

86-5.01E(1)(b) Quality Control and Assurance

86-5.01E(1)(b)(i) Pre-Acceptance Testing

For each CCTV system location perform the specific quality control requirements for testing and documentation described in the special provisions. Notify the Engineer in writing fifteen days prior to the scheduled testing. All testing must be performed by you, at a mutually agreed time and place, and in the presence of the Engineer. Demonstrate all the features of the CCTV system. Provide the necessary equipment required to access the CCTV equipment for testing. The Engineer will use the results from the pre-acceptance testing, and may discuss with the on-site technician, to determine settings used in final testing and documentation of the CCTV system.

86-5.01E(1)(b)(ii) Testing and Documentation

You are responsible for all testing and documentation required for approval and acceptance of the production, installation, and operation of these materials and equipment. The following identifies the specific quality control requirements for testing and documentation:

1. Test all cables, after installation with connectors attached, for continuity and shorts or grounds.
2. Adjust and set limit stops to the pan and tilt unit at each camera site to prevent the view of the areas outside of the roadway system. The final settings will be approved by the Engineer.
3. Perform a local functional test at each of the CCTV locations. At your option, the test may be performed directly at the CCTV cabinet or remotely via keyboard or keyboard and personal computer. Verify all the CCTV features. You must provide all test equipment.
4. Arrange to have a technician, qualified to work on the closed circuit television assembly and employed by the closed circuit television assembly manufacturer or the manufacturer's representative, present at the time the equipment is turned on.

86-5.01E(1)(b) Testing Requirements

Perform testing of hybrid cables and connectors in accordance with provisions in Section 86-2.14B, "Field Testing" of the Standard Specifications and these special provisions. Any cable lengths found to have faults must be replaced and retested. You must dispose of the removed faulty cable. The cable termination shall be randomly inspected for contact crimping quality control. Any contact found not crimped with the correct crimping tool and is defective shall be rejected. You must redo the termination until all defects are corrected.

Prior to the beginning of work, the coaxial cable length of hybrid cable shall be tested for attenuation and faults to ensure compliance with specifications contained herein using a time domain reflectometer (TDR). For the purpose of these special provisions, one or more of the following defines a fault in a long length of cable:

- A. Return loss measurements indicating that attenuation exceeds 3 dB at 5 MHz to 30 MHz in a portion of cable less than 10 feet long.
- B. A return loss measurement indicating that there is a short in the cable.
- C. A return loss measurement indicating a cut or open circuit in the cable.

D. A visual inspection that reveals exposure of or damage to the cable shielding

The video encoder shall be measured as each unit furnished, installed, configured and tested as a fully functional and integrated system component.

86-5.01E(1)(c) Warranty

Furnish a 2-year replacement warranty from the manufacturer of CCTV camera assembly and Video Encoder against defects in materials and workmanship or failures. The effective date of the warranty is the date of acceptance of the installation. Submit all warranty documentation before installation.

Replacement CCTV camera assembly and Video Encoder must be furnished within 10 days of receipt of a failed unit. The Department does not pay for replacement.

Deliver replacement CCTV camera assembly and Video Encoder to Caltrans Maintenance Electrical Maintenance Yard at: 6641 Marine Way, Irvine CA 92618

86-5.01E(2) Materials

86-5.01E(2)(a) General

The CCTV system will include the CCTV assembly and the Camera software protocol.

86-5.01E(2)(a)(i) Closed Circuit Television Camera Assembly

Prototype equipment will not be allowed. All equipment must be current standard production units.

The CCTV camera assembly must include these components:

1. Camera
2. Motorized zoom lens
3. Environmental enclosure with sun shield or shroud
4. Pan and tilt unit
5. CCTV Cabinet
6. Video Encoder

The CCTV camera assembly, including the pan and tilt unit must not exceed 7 inches wide x 12 inches high x 14 inches deep. Any external cables must not interfere with or limit the continuous pan and tilt operation.

The CCTV camera assembly must have all necessary wiring, cables, and connectors. All CCTV camera assemblies must be plug-compatible, interchangeable and suitable for use with the CCTV camera cable assembly described in the special provisions.

You must apply an approved weather-resistant spray to the inside of the connectors before engaging the connectors. Closed circuit television camera assembly components must be rated for NEMA 4X, IP 66 or IP 67.

The closed circuit television (CCTV) camera cable assembly must conform to the details shown on the plans and the special provisions.

The camera cable assembly connector assignments connectors are shown on the plans.

The CCTV camera cable assembly must conform to the following:

1. General

Overall Cable, Nom. weight/1,000 feet not to exceed:	300 lbs.
Overall Cable Minimum Bending Radius:	9 inches
All Materials, Temperature Rating, meet or exceed:	From -30 to 165°F
Overall Cable, Outside Diameter, not to exceed:	1.7 inches
Outside Jacket, Tinned Copper Braid Shield, minimum:	80 percent
Pulling tension, maximum:	500 lbs.
Overall Cable, Outside Jacket:	Black Thermoplastic Elastomer

2. For video - Coax Cable

Coax Tinned Copper Braid Shield, minimum:	95 percent
Coax Insulation Material:	Solid Polyethylene
Coax Core Outside Diameter:	0.121 inch
Coax Outside Diameter:	0.178 inch
Coax Outside Jacket:	Cotton Braid

3. For power - Shielded group of 3 twisted pairs of No. 22 AWG cables. The individual conductors must be color coded with PVC insulation for 300V minimum and used for distance up to 750 ft for 115 VAC.
4. For data – Shielded group of 5 twisted pairs of No. 26 AWG cables
5. For ground – A solid No. 8 AWG ground wire shall be provided between the camera assembly and the CCTV cabinet ground rod.

86-5.01E(2)(a)(ii) Camera

All cameras supplied must meet the following:

Parameter	Specification
Optical Device	CCD, Color, interline transfer
Optical CCD Format Size	1/4 - inch format
Horizontal Resolution	540 television lines (minimum)
Sensitivity	At F1.4, Wide Angle 35 IRE 0.5-Lux at 1/60 s, F1.4, Shutter, Color I.R. Cut On 0.05-Lux at 1/2 s, F1.4, Shutter, Color I.R. Cut On 0.2-Lux at 1/60 s, F1.4, Shutter, monochrome mode I.R. Cut Off 0.01-Lux at 1/4 s, F1.4, Shutter, monochrome mode I.R. Cut Off
Zoom and Focus Preset	64 positions with auto focus and ID
Optical Zoom Range	35X, 3.4 mm to 119 mm

The camera must be equipped with an electronic shutter with selectable speeds ranging from 1/60 to 1/30,000 second.

The camera must have the capability of superimposing 3 lines of 24 alphanumeric characters on the upper left corner of the video image. Characters shall be displayed in uppercase with white font with a black border. The Camera Assembly shall be able to activate or blank the alphanumeric display by commands through the serial port. Each character shall be between 25 and 30 TV lines high. Lines 2 and 3 shall be programmable, supporting all ASCII symbols from space (20 hexadecimal) to Z (5A hexadecimal). Line 1 shall display the word "CAMERA" and some status information generated as follows:

CHARACTER	DESCRIPTION
1 to 6	"CAMERA"
7	space (blank)
8 to 10	Camera ID
11	space
12 to 13	space, LC, LP or IM
14	space
15 to 16	space or preset position number

Characters 12-13 Detail

The Camera Assembly shall display space (blank) unless one of the conditions below is detected, in which case the Camera Assembly shall display the corresponding characters. In a case where more than one condition is detected, the characters corresponding to the highest priority condition shall be displayed (1 being highest priority and 6 being the lowest priority). The conditions are as follows:

Condition	Char.	Priority
Local	LC	1
Iris Manual	IM	2
Low Pressure	LP	3
Alarm 2	A2	4
Alarm 3	A3	5
Alarm 4	A4	6

The Camera Assembly shall be able to detect and retain in memory the above alarm and status conditions. In addition to displaying these data on the video, they shall also be sent to the CCT through the serial port. The description is as follows:

Local: This condition is activated at the CCTV site using a laptop computer.
Iris Manual: This condition is activated by command through the serial port.

Characters 15-16 Detail

If a preset position is active, the Camera Assembly shall display the corresponding preset position number in decimal, sector id, character generator.

All cameras supplied must meet the following:

Parameter	Specification
Operating Voltage	120 V(ac) \pm 10 percent (external adapter allowed)
Power Consumption	100 W (Maximum)
Video Output Signal	NTSC, 1 V p-p at 75 ohms, unbalanced
Video Output Connector	Standard BNC bulkhead on rear of camera
Signal To Noise Ratio	>50 dB
Synchronization	Internal sync or phase adjustable line lock
Video Output Level	1.0 V p-p (75 Ω composite)
Gain Control	Automatic
Automatic Back Focus (Automatic White Balance)	Required

Programming must be stored non-volatile memory and the CCTV assembly firmware must be updateable via serial communication.

All cameras supplied must meet the following:

Parameter	Specification
Operating Temperature	From -30 to 165°F
Operating Humidity	From 0 to 100 percent non-condensing

86-5.01E(2)(a)(iii) Motorized Zoom Lens

The lens must have motors for zoom, focus and iris.

The lens must have capability for focus and zoom preset positions. A telescopic converter or extender must not be used to achieve required focal length range.

The lens must meet the following:

Parameter	Specification
Iris	Motorized , with automatic and manual adjust modes
Operating temperature	From -30 to 165°F
Focal Length	0.14 to 3.25 inch (Optical power not less than 35X)
Lens Aperture	From F1.4 to F4.2
Horizontal angle of view at Maximum Focal Length	55.8 degrees to 1.7

When the camera is pointed at a very bright object and or when the camera and lens is first turned on, the image produced by the lens and camera combination must not optically "oscillate" (i.e., produce an image that alternates from too light to too dark) or otherwise be unstable.

Each lens must have an automatic, motor-driven iris with manual override.

The lens must include mechanical or electrical means to protect the motors from over running in the extreme position.

The iris must be controlled directly through the camera in automatic mode and from any keyboard connected into the camera system in the manual mode. The automatic iris must provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager. The power supply and electronics for iris motor must be contained within the environmental housing.

When the power is removed from the lens, the lens iris must automatically close.

The motorized-iris cable must be strain relieved or sufficiently rugged such that the cable will not fail at the point where it leaves the lens assembly.

86-5.01E(2)(b)(i) Environmental Enclosure

The environmental enclosure must be the sealed, pressurized type, designed to withstand exposure to sand, dust, fungus, and salt atmosphere, and house the assembled camera, motorized zoom lens and all internal wiring.

It must operate on a voltage range of 120 V(ac) \pm 10 percent power source.

The enclosure must include an internal thermostatically controlled heater assembly to minimize external faceplate condensation.

The enclosure must include a sun shield or shroud to provide protection from direct solar radiation.

You have the option of providing a sealed, pressurized Integrated Optics Cartridge (IOC) housed in a NEMA 4X rated enclosure.

The enclosure or IOC must be pressurized with 5 psi dry nitrogen. The enclosure must have a valve for pressurizing. In addition, a pressure relief valve with a 20 psi rating must be provided to protect the enclosure from overcharging. The notation "CAUTION - PRESSURIZED" must be printed on the enclosure. The letter height must be at least 1/4 inch.

The housing must meet the following:

Parameter	Specification
Construction	All aluminum
Finish	White, light beige or gray that is either baked enamel or powder coat
Weight	Less than 20 lb excluding heater
Camera Mounting	Platform mount with adjustment fore and aft

The camera lens must be positioned in the center of the housing window.

The housing unit must have lens preset capabilities.

The housing must not interfere with the widest viewing angle of the motorized zoom lens.

The camera enclosure must not incur any physical damage after a shock, return to normal operation immediately and operate within the specified vibration (see Note 1 below table).

Parameter	Specification
Shock	Up to 10 G while in non-operation mode
Vibration	From 5 Hz to 60 Hz with 0.083 inch total excursion, and 5 G rms vibration from 60 Hz to 1000 Hz.

Note 1: Where the manufacturer's cut sheet or specification data does not contain shock and vibration data a listing of at least 2 project sites with identical equipment, with similar installation conditions and similar traffic patterns showing continuous functional performance of at least 2 years may be substituted.

Any enclosure supplied must include a sun shield or shroud to protect the housing from the direct rays of the sun. The sun shroud must be made specifically for the model of enclosure that is selected.

86-5.01E(2)(c) Pan And Tilt Unit

The pan and tilt unit must consist of the pan and tilt unit itself along with any electrical or communication interfaces required to perform the functions specified.

The pan and tilt unit must be designed to operate under a full range of environmental conditions. The pan and tilt unit with camera assembly mounted must withstand a wind load of 80 mph. The cable connector must be fully weather protected. External body components must be manufactured from aluminum that have been anodized, painted or coated to prevent oxidation and corrosion.

Access into the pan and tilt unit for routine maintenance or adjustments must not require removal of the pan and tilt from the installation site, nor removal of the camera enclosure from the pan and tilt unit. Access cover must be readily removable regardless of the tilt position.

The housing must meet the following:

Parameter	Specification
Pan and Tilt Worms	Ground and polished Stainless Steel
Pan and Tilt Worm Gears	Non-metallic material
Camera Mount	Compatible with camera housing
Bearings on Rotating Surfaces	Heavy duty roller type
Overload Protection	Provided - internal
Operating Temperature	From -30 to 165°F
Construction	Corrosion resistant steel or aluminum
Finish	Weather resistant paint or polyurethane
Seals	"O" ring or gaskets for all weather protection of pan and tilt unit and cables.

The housing must meet the following:

Parameter	Specification
Braking: Pan And Tilt	Mechanical or Electrical to limit coast
Overload Protection	Motors: Impedance protected
Angular Travel	Pan: From 20 to -90 degrees horizontal, Continuous Tilt: From +90 degrees up to -90 degrees down
Pan Speed	From 0.1 to 80 degrees/s variable-speed
Tilt Speed	From 0.1 to 40 degrees/s variable-speed
Pan And Tilt Position Preset	Positions camera to a predetermined azimuth, elevation and lens position (Minimum of 64 Presets)

The pan and tilt unit must have pan and tilt stops. The settings of these pan and tilt stops will be determined by the Engineer.

86-5.01E(2)(d) Closed Circuit Television Cabinet

CCTV Cabinet must be Type 334-TV. Type 334-TV cabinet shall consist of the following:

- A. Housing and Mounting cage.
- C. Power distribution assembly.
- D. Thermostatically controlled fan.
- E. All necessary mounting hardware and wiring, foundation and anchor bolts and other equipment, as shown on the plans and specified in these special provisions.

The housing and the mounting cage shall conform to those of the Model 334 controller cabinet provisions of the TEES and to all addendums thereto current at the time of project advertising. Police panel is not required.

Foundations for housing Type 1 shall conform to the details on Standard Plan ES-3C for Model 332 and 334 controller cabinets.

The power distribution assembly shall consist of the following: one 30 A, 120 V(ac) minimum, single pole main breaker; three 15 A, 120 V(ac) minimum, single pole secondary breakers; 8 standard 117 V(ac) receptacles; and one duplex, 3 prong, NEMA Type 5 15R grounded utility type outlet. The power distribution assembly shall protect the equipment powered by the assembly from power transients. Over voltage protection shall be provided for the power distribution assembly and shall contain as a minimum, a surge arrestor which shall reduce the effect of power line voltage transients and be rated as follows:

Recurrent Peak Voltage	184 V
Energy Rating (Minimum)	20 J
Power Dissipation, Average	0.85 W
Peak Current for pulses less than 7 microseconds	1250 A
Stand-by Current for 60 Hz sinusoidal	1 mA or less

The thermostatically controlled fan shall provide 150 cubic foot per minute of ventilation. The fan shall be activated when the temperature inside the cabinet exceeds 75 °F and shut off when the temperature is less than 64 °F. All vents shall be filtered.

All cabinet assemblies shall be tested to demonstrate the correct function of all controls in the presence of the Engineer.

86-5.01E(2)(e) Video Encoder

Video encoder must conform to the details shown on the plans and the special provisions.

Electrical power requirements for all new equipment, including surge suppression of transient voltage spikes shall be documented and shall be met for each equipment configuration.

The video encoder shall have remote diagnostic capabilities (from the TMC) and locally in the field cabinet including a built in web server. The Contractor shall provide all IP video encoder manufacturers' recommended hardware options such as lightning arrestors and multiplex devices for use with multiple input IP video encoder.

Video encoder must have the following features:

Video Encoder	
Feature	Parameter/Remarks
Video Standard	SMPTE-170, 75 ohm
Video Input	75 ohm, BNC Connector
Video Compression	MPEG-4 Part 2 (ISO/IEC 14496-2) and Motion JPEG
Video Transmission	768kHz at 30fps
Network Interface	Auto sensing 10/100 BaseT port, IEEE 802.3
Protocol Support	TCP/IP, UDP/IP (unicast and multicast), Telnet
Frame Rate	Up to 30 fps at 2CIF
Network Connector	8P8C modular
Serial Data Connector	DE-9
Serial Line Standard	Selectable between TIA-232, TIA-422, TIA-485
Serial Port Function	CCTV command and control
Serial Console Port	TIA-232
Encoder Software Updates	Via Serial port or network port
Encoder Configuration	Via Serial port or network port
Encoder Identification	IP addressable
Image quality and frame rate	configurable
Physical	1U height Rack Mountable, 12" Deep
Operating Temperature	From -30 to 165°F
Operating Humidity	80 percent maximum relative humidity, non-condensing
Power Input	Power supply (5 V(dc) maximum), 6 watts (maximum) consumption

86-5.01E(2)(f) Camera Software Protocol

The proposed camera protocol must include integrated video camera system communication drivers for flexibility and system interoperability. The camera system must support both serial TIA-422 and TIA-232 communication channels at a minimum, allowing field selection of the following protocol drivers as required;

All camera and pan and tilt functions are operated via TIA-232 and TIA-422 serial communication.

All communication bytes described below are expressed in hexadecimal. When any other format is specified, the values shall be translated into hexadecimal.

The protocol for communication from CCT to Camera Assembly shall be as follows:

Byte	Description
1	1B
2-4	43, 54, 56
5	Camera Assembly ID, least-significant byte
6	Camera Assembly ID, most-significant byte
7	Number of command and data bytes
8	COMMAND
9-X	DATA
X+1	CHECKSUM

Byte 1: 1B implies communication from the Central Communications Central (CCT) to Camera Assembly.
Byte 2 through 4: ASCII code values for "CCTV."
Byte 5 and 6: Camera Assembly ID. This ID will be used to communicate to a specific CCTV on a multidrop communication line.
Byte 7: This number will indicate how many command and data bytes will follow.
Byte 8: See Table 1 below.
Byte 9 to X: See Table 1 below.
Byte X plus 1: Checksum. This is a hexadecimal sum of Bytes 1 to X.

TABLE 1			
Byte 7	Byte 8 ASCII		Byte 9 to Byte X
	Char.	Description	
1	Q	Status Query	-
1	R	Pan Right	-
1	L	Pan Left	-
1	U	Tilt Up	-
1	D	Tilt Down	-
1	I	Zoom In	-
1	O	Zoom Out	-
1	N	Focus Near	-
1	F	Focus Far	-
1	J	Iris Open	-
1	K	Iris Close	-
1	M	Iris Manual	-
1	m	Iris Auto	-
1	p	Pan Stop	-
1	t	Tilt Stop	-
1	z	Zoom Stop	-
1	f	Focus Stop	-
1	i	Iris Stop	-
Up to 33 (Decimal)	C	Set Char. Display	Up to 32 ASCII Char.
1	A	Activate Char. Display	-
1	B	Blank Char. Display	-
2	P	Set Preset Position	Position Number (1-10 Decimal)
2	G	Go to Preset Position	Position Number (1-10 Decimal)
2	S	Set Relay	Relay Number (1-6)
2	s	Reset Relay	Relay Number (1- 6)
1	E	Turn on Camera	-
1	e	Turn off Camera	-
1	X	Reset Camera	-
9	Y	Go to coordinates	Coord. data (8 bytes)

The protocol for communication from Camera Assembly to CCT shall conform to the following:

The Camera Assembly shall send a message back to CCT in response to every (valid) command received as follows:

BYTE	DESCRIPTION
1	09
2 to 4	43, 54, 56
5	Camera Assembly ID, L.S. byte
6	Camera Assembly ID, M.S. byte
7	0C
8	COMMAND
9 to 11	STATUS
12 to 19	POSITION DATA
20	CHECKSUM

Byte 1: 09 implies communication from the Camera Assembly to CCT.

Byte 2 through 4: ASCII values for CCTV.

Byte 5, 6: Camera Assembly ID.

Byte 7: This number indicates that there are 12 bytes to follow before checksum.

Byte 8: This will be identical to byte 8 of the message from CCT.

Byte 9-11: Status bytes. These bytes are described in the tables below. Bit 1 is the least significant bit (LSB).

Byte 9			
BIT	FUNCTION	0	1
1	Focus	Auto	Manual
2	Color/Mono	Color	Mono
3	Color/Mono	Auto	Manual
4	Integration	Auto	Manual
5	Integration	Decrease	Increase
6	Data Flow Control	Off	On
7	Iris	Auto	Manual
8	Char. Display	Blank	Active

Byte 10			
BIT	FUNCTION	0	1
1	Reserved		
2	Local/Remote	Local	Remote
3	Camera power	Off	On
4	Pressure	Good	Low
5	Alarm 2	No alarm	Alarm present
6	Alarm 3	No alarm	Alarm present
7	Alarm 4	No alarm	Alarm present
8	Video status	Video Present	No Video

No Video: The Camera Assembly shall have the circuitry to detect absence and presence of video sync signal on its video input. Absence of the video sync signal shall indicate a no-video condition.

Byte 11: This byte will equal zero if the camera is not positioned at any of the preset positions. Otherwise this byte will contain the preset position number (1 to 10 decimal).

Byte 12-19: These bytes shall contain pan, tilt, zoom and focus position data. The values for the extreme positions are described below. The values shall range from 0000 to 0FFF (0 to 4095 decimal) and shall change linearly as the positions are varied. The extreme position data are as follows:

Byte 12	Byte 13	
00	00	Pan Left
0F	FF	Pan Right
Byte 14	Byte 15	
00	00	Tilt Down
0F	FF	Tilt Up
Byte 16	Byte 17	
00	00	Zoom Out
0F	FF	Zoom In
Byte 18	Byte 19	
00	00	Focus Far
0F	FF	Focus Near

Byte 20 is checksum. The checksum is a hexadecimal sum of all the bytes 1 to X.

86-5.01E(3) Construction

Route Control cable from the CCTV camera assembly to the video encoder and AC power inside the camera pole. Wiring must run continuous from source to destination without splices.

Provide Cable slack of not less than 3 feet for equipment movement at pull boxes, vaults or cabinets. The cable must be secured and coiled neatly.

Install the cables and connectors to allow the camera and lens to be disconnected without removing the environmental camera housing.

Cable grip and J-hook must be as shown in the contract plans.

You are responsible for all testing and documentation required to establish approval and acceptance of the production, installation, and operation of these materials and equipment.

Provide all materials necessary to make the connectors functional. All materials used to make the connectors must be compatible and must adhere to manufacturer's recommendations.

You must make all the necessary adjustments on different components of the CCTV camera assembly. This includes the back-focus and tracking adjustments on the lens and color balancing of the camera.

You must ensure the back-focus adjustment on the camera is such that the lens focus is properly set and maintained when adjusting the focal length from zoom to wide angle. You must make this adjustment with the lens iris at full open position. This adjustment must be made such that when the zoom is adjusted from long range (telephoto) to wide angle, no refocusing is necessary.

The Engineer will notify you of the pan and tilt presets and stops for you to set prior to the CCTV camera assembly installation check. You must perform the installation check in the presence of the Engineer. At your option, the test of the operation (pan, tilt, zoom, iris and wiper) of the pan and tilt unit may be performed at the CCTV cabinet adjacent to the camera or by remote keyboard location. You must furnish a color video monitor, for testing only, to view the actual camera image. Upon completion of the installation check, the Engineer will verify operation of the pan and tilt unit. Any additional adjustments necessary to restore the presets and stops to acceptable parameters is at your expense.

86-5.01E(4) Payment

Not Used

Replace section 86-6.01 with:

86-6.01 LED LUMINAIRES

86-6.01A General

86-6.01A(1) Summary

Section 86-6.01 includes specifications for installing LED luminaires.

86-6.01A(2) Definitions

CALiPER: Commercially Available LED Product Evaluation and Reporting. A U.S. DOE program that individually tests and provides unbiased information on the performance of commercially available LED luminaires and lights.

correlated color temperature: Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

house side lumens: Lumens from a luminaire directed to light up areas between the fixture and the pole (e.g., sidewalks at intersection or areas off of the shoulders on freeways).

International Electrotechnical Commission (IEC): Organization that prepares and publishes international standards for all electrical, electronic and related technologies.

junction temperature: Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.

L70: Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from initial values.

LM-79: Test method from the Illumination Engineering Society of North America (IESNA) specifying test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

LM-80: Test method from the IESNA specifying test conditions, measurements, and report format for testing and estimating the long term performance of LEDs for general lighting purposes.

National Voluntary Laboratory Accreditation Program (NVLAP): U.S. DOE program that accredits independent testing laboratories to qualify.

power factor: Ratio of the real power component to the complex power component.

street side lumens: Lumens from a luminaire directed to light up areas between the fixture and the roadway (e.g., traveled ways, freeway lanes).

surge protection device (SPD): Subsystem or component that can protect the unit against short duration voltage and current surges.

total harmonic distortion: Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

86-6.01A(3) Submittals

Submit a sample luminaire to METS for testing after the manufacturer's testing is completed. Include the manufacturer's testing data.

Product submittals must include:

1. LED luminaire checklist.
2. Product specification sheets, including:
 - 2.1. Maximum power in watts.
 - 2.2. Maximum designed junction temperature.
 - 2.3. Heat sink area in square inches.
 - 2.4. Designed junction to ambient thermal resistance calculation with thermal resistance components clearly defined.
 - 2.5. L70 in hours when extrapolated for the average nighttime operating temperature.
3. IES LM-79 and IES LM-80 compliant test reports from a CALiPER-qualified or NVLAP-approved testing laboratory for the specific model submitted.
4. Photometric file based on LM-79 test report.
5. Initial and depreciated isofootcandle diagrams showing the specified minimum illuminance for the particular application. The diagrams must be calibrated to feet and show a 40 by 40 foot grid. The diagrams must be calibrated to the mounting height specified for that particular application. The depreciated isofootcandle diagrams must be calculated at the minimum operational life.
6. Test report showing SPD performance as tested under ANSI/IEEE C62.41.2 and ANSI/IEEE C62.45.
7. Test report showing mechanical vibration test results as tested under California Test 611 or equal.
8. Data sheets from the LED manufacturer that include information on life expectancy based on junction temperature.
9. Data sheets from the power supply manufacturer that include life expectancy information.

Submit documentation of a production QA performed by the luminaire manufacturer that ensures the minimum performance levels of the modules comply with the section 86-6.01 specifications and includes a documented process for resolving problems. Submit documentation as an informational submittal.

Submit warranty documentation as an informational submittal before installing LED luminaires.

86-6.01A(4) Quality Control and Assurance

86-6.01A(4)(a) General

The Department may perform random sample testing on the shipments. The Department completes testing within 30 days after delivery to METS. Luminaires are tested under California Test 678. All parameters specified in section 86-6.01 specifications may be tested on the shipment sample. When testing is complete, the Department notifies you. Pick up the equipment from the test site and deliver to the job site.

One sample luminaire must be fitted with a thermistor or thermo-couple temperature sensor. A temperature sensor must be mounted on the LED solder pad as close to the LED as possible. A temperature sensor must be mounted on the power supply case. Light bar or modular systems must have 1 sensor for each module mounted as close to the center of the module as possible. Other configurations must have at least 5 sensors per luminaire. Contact METS for advice on sensor location. Thermocouples must be either Type K or C. Thermistors must be a negative temperature coefficient type with a nominal resistance of 20 k Ω . The appropriate thermocouple wire must be used. The leads must be a minimum of 6 feet. Documentation must accompany the test unit that details the type of sensor used.

The sample luminaires must be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +70 degrees F before performing any testing.

The luminaire lighting performance must be depreciated for the minimum operating life by using the LED manufacturer's data or the data from the LM-80 test report, whichever results in a higher lumen depreciation.

Failure of the luminaire that renders the unit noncompliant with section 86-6.01 specifications is cause for rejection. If a unit is rejected, allow 30 days for retesting. The retesting period starts when the replacement luminaire is delivered to the test site.

If a luminaire submitted for testing does not comply with section 86-6.01, remove the unit from METS within 5 business days after notification the unit is rejected. If the unit is not removed within that period, the Department may ship the unit to you and deduct the cost.

86-6.01A(4)(b) Warranty

Furnish a 7-year replacement warranty from the manufacturer of the luminaires against any defects or failures. The effective date of the warranty is the date of installation. Furnish replacement luminaires within 10 days after receipt of the failed luminaire. The Department does not pay for the replacement. Deliver replacement luminaires to the following department maintenance electrical shop:

Batavia Maintenance Yard
1808 North Batavia
Orange, CA 92865

86-6.01B Materials

86-6.01B(1) General

The luminaire must include an assembly that uses LEDs as the light source. The assembly must include a housing, an LED array, and an electronic driver. The luminaire must:

1. Be UL listed under UL 1598 for luminaires in wet locations or an equivalent standard from a recognized testing laboratory
2. Have a minimum operational life of 63,000 hours
3. Operate at an average operating time of 11.5 hours per night
4. Be designed to operate at an average nighttime operating temperature of 70 degrees F
5. Have an operating temperature range from -40 to +130 degrees F
6. Be defined by the following application:

Application	Replaces
Roadway 1	200 Watt HPS mounted at 34 ft
Roadway 2	310 Watt HPS mounted at 40 ft
Roadway 3	310 Watt HPS mounted at 40 ft with back side control
Roadway 4	400 Watt HPS mounted at 40 ft

The individual LEDs must be connected such that a catastrophic loss or a failure of 1 LED does not result in the loss of more than 20 percent of the luminous output of the luminaire.

86-6.01B(2) Luminaire Identification

Each luminaire must have the following identification permanently marked inside the unit and outside of its packaging box:

1. Manufacturer's name
2. Trademark
3. Model no.
4. Serial no.
5. Date of manufacture (month-year)
6. Lot number
7. Contract number
8. Rated voltage
9. Rated wattage
10. Rated power in VA

86-6.01B(3) Electrical Requirements

The luminaire must operate from a 60 ± 3 Hz AC power source. The fluctuations of line voltage must have no visible effect on the luminous output. The operating voltage may range from 120 to 480 V(ac). The luminaire must operate over the entire voltage range or the voltage range must be selected from either of the following options:

1. Luminaire must operate over a voltage range of 95 to 277 V(ac). The operating voltages for this option are 120 V(ac) and 240 V(ac).
2. Luminaire must operate over a voltage range of 347 to 480 V(ac). The operating voltage for this option is 480 V(ac).

The power factor of the luminaire must be 0.90 or greater. The total harmonic distortion, current and voltage, induced into an AC power line by a luminaire must not exceed 20 percent. The maximum power consumption allowed for the luminaire must be as shown in the following table:

Application	Maximum consumption (Watts)
Roadway 1	165
Roadway 2	235
Roadway 3	235
Roadway 4	300

86-6.01B(4) Surge Suppression and Electromagnetic Interference

The luminaire on-board circuitry must include an SPD to withstand high repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The SPD must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The SPD must comply with UL 1449. The SPD performance must be tested under ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

The luminaires and associated on-board circuitry must comply with the Class A emission limits provided in 47 CFR 15, subpart B concerning the emission of electronic noise.

86-6.01B(5) Compatibility

The luminaire must be operationally compatible with currently used lighting control systems and photoelectric controls.

86-6.01B(6) Photometric Requirements

The luminaire must maintain a minimum illuminance level throughout the minimum operating life. The L70 of the luminaire must be the minimum operating life or greater. The measurements must be calibrated to standard photopic calibrations. The minimum maintained illuminance values measured at a point must be as shown in the following table:

Application	Mounting height (ft)	Minimum maintained illuminance (fc)	Light pattern figure (isofootcandle curve)
Roadway 1	34	0.15	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 2	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 3	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1$ <p>for $y \geq 0$ (street side)</p> <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.</p>

Roadway 4	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.</p>
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The luminaire must have a correlated color temperature range from 3,500 to 6,500 K. The color rendering index must be 65 or greater.

The luminaire must not allow more than:

1. 10 percent of the rated lumens to project above 80 degrees from vertical
2. 2.5 percent of the rated lumens to project above 90 degrees from vertical

86-6.01B(7) Thermal Management

The passive thermal management of the heat generated by the LEDs must have enough capacity to ensure proper operation of the luminaire over the minimum operation life. The LED maximum junction temperature for the minimum operation life must not exceed 221 degrees F.

The junction-to-ambient thermal resistance must be 95 degrees F per watt or less. The use of fans or other mechanical devices is not allowed. The heat sink material must be aluminum or other material of equal or lower thermal resistance.

The luminaire must contain circuitry that automatically reduces the power to the LEDs to a level that ensures the maximum junction temperature is not exceeded when the ambient outside air temperature is 100 degrees F or greater.

86-6.01B(8) Physical and Mechanical Requirements

The luminaire must be a single, self-contained device, not requiring job site assembly for installation. The power supply for the luminaire is integral to the unit. The weight of the luminaire must not exceed 35 lb. The maximum effective projected area when viewed from either side or either end must be 1.4 sq ft. The housing color must match a color no. from 26152 to 26440 or from 36231 to 36375, or color no. 36440 of FED-STD-595.

The housing must be fabricated from materials designed to withstand a 3,000-hour salt spray test under ASTM B 117. All aluminum used in housings and brackets must be of a marine grade alloy with less than 0.2 percent copper. All exposed aluminum must be anodized.

Each refractor or lens must be made from UV-inhibited high impact plastic such as acrylic or polycarbonate or heat- and impact-resistant glass and be resistant to scratching. Polymeric materials except lenses of enclosures containing either the power supply or electronic components of the luminaire must be made of UL94VO flame retardant materials. Paint or powder coating of the housing must comply with section 86-2.16. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

Each housing must be provided with a slip fitter capable of mounting on a 2-inch pipe tenon. This slip fitter must fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches. The slip fitter must be capable of being adjusted a minimum of ± 5 degrees from the axis of the tenon in a minimum of five steps: +5, +2.5, 0, -2.5, -5. The clamping brackets of the slip fitter must not bottom out on the housing bosses when adjusted within the designed angular range. No part of the slip fitter mounting brackets on the luminaires must develop a permanent set in excess of 1/32 inch when the two or four 3/8-inch diameter cap screws used for mounting are tightened to 10 ft-lb. Two sets of cap screws may be furnished to allow the slip fitter to be mounted on the pipe tenon in the acceptable range without the cap screws bottoming out in the threaded holes. The cap screws and the clamping brackets must be made of corrosion resistant

materials or treated to prevent galvanic reactions and be compatible with the luminaire housing and the mast arm.

The assembly and manufacturing process for the LED luminaire must be designed to ensure internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. When tested under California Test 611, the luminaire to be mounted horizontally on the mast arm must be capable of withstanding the following cyclic loading for a minimum of 2 million cycles without failure of any luminaire part:

Cyclic Loading		
Plane	Power supply	Minimum peak acceleration level
Vertical	Installed	3.0 g peak-to-peak sinusoidal loading (same as 1.5 g peak)
Horizontal ^a	Installed	1.5 g peak-to-peak sinusoidal loading (same as 0.75 g peak)

^aPerpendicular to the direction of the mast arm

The housing must be designed to prevent the buildup of water on top of the housing. Exposed heat sink fins must be oriented to allow water to freely run off of the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an ANSI/IEC rating of IP66. The power supply enclosure must be protected to at least an ANSI/IEC rating of IP43.

Each mounted luminaire must be furnished with an ANSI C136.41-compliant, locking type photocontrol receptacle with dimming connections and a rain tight shorting cap. The receptacle must comply with section 86-6.11A.

When the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door must be secured to the housing such that accidental opening is prevented. A safety cable must mechanically connect the door to the housing.

Field wires connected to the luminaire must terminate on a barrier type terminal block secured to the housing. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6. Each terminal position must be clearly identified.

The power supply must be rated for outdoor operation and have at least an ANSI/IEC rating of IP65.

The power supply must be rated for a minimum operational life equal to the minimum operational life of the luminaire or greater.

The power supply case temperature must have a self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.

The power supply must have 2 leads to accept standard 0-10 V(dc). The dimming control must be compatible with IEC 60929. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.

Conductors and terminals must be identified.

Add to section 86-8.01:

Payment for highway lighting at intersections in connection with signals is included in the payment for signal and lighting.

Payment for other roadway lighting on the project is included in the payment for lighting and sign illumination.

For each item shown in the following table, the Department deducts the corresponding amount shown:

Source Inspection Expense Deductions		
Item	Distance ^a	Deduction
Service equipment enclosures Contractor-furnished closed circuit television cabinets	> 300	\$2,000

^aDistance is air-line miles from both Sacramento and Los Angeles to the inspection source.

AA

DIVISION X MATERIALS
87 MATERIALS—GENERAL

Replace section 87-2 with:
87-2 AGGREGATE

87-2.01 GENERAL

87-2.01A Summary

Section 87-2 includes specifications for furnishing aggregate.

87-2.01B Definitions

stockpile lot: Stockpile or portion of a stockpile of steel slag aggregate used.

87-2.01C Submittals

Submit a certificate of compliance for:

- 1. Each stockpile lot
- 2. Steel slag

87-2.02 MATERIALS

87-2.02A General

Do not use air-cooled iron blast furnace slag to produce aggregate for:

- 1. Structure backfill material
- 2. Pervious backfill material
- 3. Permeable material
- 4. Reinforced or prestressed PCC component or structure
- 5. Nonreinforced PCC component or structure for which a Class 1 surface finish under section 51-1.03F(3) is required

Do not use aggregate produced from slag resulting from a steel-making process except in:

- 1. Imported borrow
- 2. AS
- 3. Class 2 AB
- 4. HMA

Steel slag used to produce aggregate for AS and Class 2 AB must be crushed such that 100 percent of the material will pass a 3/4-inch sieve and then control aged for at least 3 months under conditions that will maintain all portions of the stockpiled material at a moisture content in excess of 6 percent of the dry weight of the aggregate.

For steel slag aggregate, provide separate stockpiles for controlled aging of the slag. An individual stockpile must not contain less than 10,000 tons or more than 50,000 tons of slag. The material in each individual stockpile must be assigned a unique lot number, and each stockpile must be identified with a permanent system of signs. Maintain a permanent record of:

1. Dates for:
 - 1.1. Completion of stockpile
 - 1.2. Start of controlled aging
 - 1.3. Completion of controlled aging
 - 1.4. Making of tests
2. Test results

For each stockpile of steel slag aggregate, moisture tests must be made at least once each week. The time covered by tests that show a moisture content of 6 percent or less is not included in the aging time.

Notify METS and the Engineer upon completion of each stockpile and the start of controlled aging and upon completion of controlled aging. Do not add aggregate to a stockpile unless a new aging period is started.

Steel slag used for imported borrow must be weathered for at least 3 months.

Each delivery of aggregate containing steel slag for AS or Class 2 AB must include a delivery tag for each load. The tag must identify the lot by the stockpile number, slag aging location, and stockpile completion and controlled aging start date.

You may blend air-cooled iron blast furnace slag or natural aggregate in proper combinations with steel slag aggregate to produce the specified gradings.

California Test 202 is modified by California Test 105 whenever the difference in sp gr between the coarse and fine portions of the aggregate or between the blends of different aggregates is 0.2 or more.

For slag used as aggregate in HMA, the Kc factor requirements in California Test 303 do not apply.

If steel slag aggregates are used to produce HMA, no other aggregates may be used in the mixture except that up to 50 percent of the material passing the no. 4 sieve may consist of iron blast furnace slag aggregates, natural aggregates, or a combination of these. If iron blast furnace aggregates, natural aggregates, or a combination of these are used in the mixture, each aggregate type must be fed to the drier at a uniform rate. Maintain the feed rate of each aggregate type within 10 percent of the amount set. Provide adequate means for controlling and checking the feeder accuracy.

Store steel slag aggregate separately from iron blast furnace slag aggregate. Store each slag aggregate type separately from natural aggregate.

For HMA produced from steel slag aggregates, iron blast furnace slag aggregates, natural aggregates, or any combination of these, the same aggregate must be used throughout any one layer. Once an aggregate type is selected, do not change it without authorization.

Aggregate containing slag must comply with the applicable quality requirements for the bid items in which the aggregate is used.

87-2.03 CONSTRUCTION

Do not place aggregate produced from slag within 1 foot of a non-cathodically protected pipe or structure unless the aggregate is incorporated in concrete pavement, in HMA, or in treated base.

Do not place slag aggregate used for embankments within 18 inches of finished slope lines measured normal to the plane of the slope.

87-2.04 PAYMENT

The Department reduces the payment quantity of HMA if:

1. Steel slag aggregates are used to produce HMA
2. The sp gr of a compacted stabilometer test specimen is in excess of 2.40

The Department prepares the stabilometer test specimen under California Test 304 and determines the sp gr of the specimen under Method C of California Test 308.

The Department determines the HMA payment quantity by multiplying the quantity of HMA placed in the work by 2.40 and dividing the result by the sp gr of the compacted stabilometer test specimen. The Department applies this quantity reduction as often as necessary to ensure accurate results.

AA

88 GEOSYNTHETICS

Add to section 88-1.02B:

Filter fabric for rock slope protection must be Class A.

Filter fabric for underdrain must be Class A.

AA

90 CONCRETE

Add to section 90-1.02G(6):

For concrete at Station "A" 382+22 Left and Station "A" 398+69 Left, the ratio of the quantity of free water to the quantity of cementitious material must not exceed 0.45.

Add to section 90-1.02H:

Concrete in contact with soil at locations shown in the following table is in a corrosive environment.

Location ID	Description
A	Station "A" 340+41 Right
B	Station "A" 345+39 Right
C	Station "A" 354+96 Left
D	Station "A" 358+49 Right
E	Station "A" 359+58 Left
F	Station "A" 361+81 Right
G	Station "A" 362+65 Left
H	Station "A" 364+25 Right
I	Station "A" 365+30 Right
J	Station "A" 366+17 Left
K	Station "A" 367+14 Right
L	Station "A" 397+27 Left
M	Br. No. 55-0226
N	Br. No. 55-0227
O	Br. No. 55-0510
P	Br. No. 55E0134 (Retaining Wall No. 349)
Q	Br. No. 55E0135 (Retaining Wall No. 387)

For concrete at Locations A, B, C, E, F, G, H, I and L (excluding Locations M, N, O, P, Q), the cementitious material must be composed of one of the following, by weight:

1. 20 percent natural pozzolan or fly ash with a CaO content of up to 10 percent, 5 percent silica fume, and 75 percent portland cement
2. 12 percent silica fume, metakaolin, or UFFA, and 88 percent portland cement
3. 50 percent GGBFS and 50 percent portland cement

For concrete at Locations D, J, K, M, N, O, P, and Q, the ratio of the quantity of free water to the quantity of cementitious material must not exceed 0.40.

Add to section 90-2.02B:

You may use rice hull ash as an SCM. Rice hull ash must comply with AASHTO M 321 and the chemical and physical requirements shown in the following tables:

Chemical property	Requirement (percent)
Silicon dioxide (SiO ₂) ^a	90 min
Loss on ignition	5.0 max
Total alkalies as Na ₂ O equivalent	3.0 max

Physical property	Requirement
Particle size distribution	
Less than 45 microns	95 percent
Less than 10 microns	50 percent
Strength activity index with portland cement ^b	
7 days	95 percent (min percent of control)
28 days	110 percent (min percent of control)
Expansion at 16 days when testing project materials under ASTM C 1567 ^c	0.10 percent max
Surface area when testing by nitrogen adsorption under ASTM D 5604	40.0 m ² /g min

^aSiO₂ in crystalline form must not exceed 1.0 percent.

^bWhen tested under AASHTO M 307 for strength activity testing of silica fume.

^cIn the test mix, Type II or V portland cement must be replaced with at least 12 percent rice hull ash by weight.

For the purpose of calculating the equations for the cementitious material specifications, consider rice hull ash to be represented by the variable *UF*.

AA

**REVISED STANDARD SPECIFICATIONS
APPLICABLE TO THE 2010 EDITION
OF THE STANDARD SPECIFICATIONS**

REVISED STANDARD SPECIFICATIONS DATED 04-19-13

Revised standard specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*. A date under a main-section heading is the date of the latest revision to the section.

Each revision to the *Standard Specifications* begins with a revision clause that describes a revision to the *Standard Specifications* or introduces a revision to the *Standard Specifications*. For a revision clause that describes a revision, the date on the right above the clause is the publication date of the revision. For a revision clause that introduces a revision, the date on the right above a revised term, phrase, clause, paragraph, or section is the publication date of the revised term, phrase, clause, paragraph, or section. For a multiple-paragraph or multiple-section revision, the date on the right above a paragraph or section is the publication date of the paragraphs or sections that follow.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

DIVISION I GENERAL PROVISIONS

1 GENERAL

04-19-13

Replace "current" in the 2nd paragraph of section 1-1.05 with:

most recent

04-20-12

Add to the 4th paragraph of section 1-1.05:

04-20-12

Any reference directly to a revised standard specification section is for convenience only. Lack of a direct reference to a revised standard specification section does not indicate a revised standard specification for the section does not exist.

Add to the 1st table in section 1-1.06:

04-19-13

LCS	Department's lane closure system
POC	pedestrian overcrossing
QSD	qualified SWPPP developer
QSP	qualified SWPPP practitioner
TRO	time-related overhead
WPC	water pollution control

Delete the abbreviation and its meaning for *UDBE* in the 1st table of section 1-1.06.

06-20-12

Delete "Contract completion date" and its definition in section 1-1.07B.

Delete "critical delay" and its definition in section 1-1.07B.

Replace "day" and its definition in section 1-1.07B with:

day: 24 consecutive hours running from midnight to midnight; calendar day.

1. **business day:** Day on the calendar except a Saturday and a holiday.
2. **working day:** Time measure unit for work progress. A working day is any 24-consecutive-hour period except:
 - 2.1. Saturday and holiday.
 - 2.2. Day during which you cannot perform work on the controlling activity for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due to any of the following:
 - 2.2.1. Adverse weather-related conditions.
 - 2.2.2. Maintaining traffic under the Contract.
 - 2.2.3. Suspension of a controlling activity that you and the Engineer agree benefits both parties.
 - 2.2.4. Unanticipated event not caused by either party such as:
 - 2.2.4.1. Act of God.
 - 2.2.4.2. Act of a public enemy.
 - 2.2.4.3. Epidemic.
 - 2.2.4.4. Fire.
 - 2.2.4.5. Flood.
 - 2.2.4.6. Governor-declared state of emergency.
 - 2.2.4.7. Landslide.
 - 2.2.4.8. Quarantine restriction.
 - 2.2.5. Issue involving a third party, including:
 - 2.2.5.1. Industry or area-wide labor strike.
 - 2.2.5.2. Material shortage.
 - 2.2.5.3. Freight embargo.
 - 2.2.5.4. Jurisdictional requirement of a law enforcement agency.
 - 2.2.5.5. Workforce labor dispute of a utility or nonhighway facility owner resulting in a nonhighway facility rearrangement not described and not solely for the Contractor's convenience. Rearrangement of a nonhighway facility includes installation, relocation, alteration, or removal of the facility.
 - 2.3. Day during a concurrent delay.
3. **original working days:**
 - 3.1. Working days to complete the work shown on the *Notice to Bidders* for a non-cost plus time based bid.
 - 3.2. Working days bid to complete the work for a cost plus time based bid.

Where working days is specified without the modifier "original" in the context of the number of working days to complete the work, interpret the number as the number of original working days as adjusted by any time adjustment.

Replace "Contract" in the definition of "early completion time" in section 1-1.07B with:

work

Replace "excusable delay" and its definition in section 1-1.07B with:

10-19-12

delay: Event that extends the completion of an activity.

1. **excusable delay:** Delay caused by the Department and not reasonably foreseeable when the work began such as:
 - 1.1. Change in the work
 - 1.2. Department action that is not part of the Contract
 - 1.3. Presence of an underground utility main not described in the Contract or in a location substantially different from that specified
 - 1.4. Described facility rearrangement not rearranged as described, by the utility owner by the date specified, unless the rearrangement is solely for the Contractor's convenience
 - 1.5. Department's failure to obtain timely access to the right-of-way
 - 1.6. Department's failure to review a submittal or provide notification in the time specified
2. **critical delay:** Excusable delay that extends the scheduled completion date
3. **concurrent delay:** Occurrence of at least 2 of the following events in the same period of time, either partially or entirely:
 - 3.1. Critical delay
 - 3.2. Delay to a controlling activity caused by you
 - 3.3. Non-working day

Replace "project" in the definition of "scheduled completion date" in section 1-1.07B with:

10-19-12

work

Add to section 1-1.07B:

10-19-12

Contract time: Number of original working days as adjusted by any time adjustment.

06-20-12

Disadvantaged Business Enterprise: Disadvantaged Business Enterprise as defined in 49 CFR 26.5.

Replace "PO BOX 911" in the District 3 mailing address in the table in section 1-1.08 with:

04-20-12

703 B ST

Add to the table in section 1-1.11:

01-20-12

Office Engineer--All Projects Currently Advertised	http://www.dot.ca.gov/hq/esc/oe/weekly_ads/all_advertised.php	--	--
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AA

2 BIDDING

10-19-12

Replace the 3rd paragraph of section 2-1.06B with:

01-20-12

If an *Information Handout* or cross sections are available:

1. You may view them at the Contract Plans and Special Provisions link at the Office Engineer–All Projects Currently Advertised Web site
2. For an informal-bid contract, you may obtain them at the Bidders' Exchange street address

Add a paragraph break between the 1st and 2nd sentences of the 5th paragraph of section 2-1.06B.

01-20-12

Add between "and" and "are" in item 2 in the list in the 7th paragraph of section 2-1.06B:

04-20-12

they

Delete "Underutilized" in "Underutilized Disadvantaged Business Enterprises" in the heading of section 2-1.12B.

06-20-12

Delete *U* in *UDBE* at each occurrence in section 2-1.12B.

06-20-12

Replace the 2nd paragraph of section 2-1.12B(1) with:

06-20-12

To ensure equal participation of DBEs provided in 49 CFR 26.5, the Department shows a goal for DBEs.

Delete the 3rd paragraph of section 2-1.12B(1):

06-20-12

Replace the 7th paragraph of section 2-1.12B(1) with:

06-20-12

All DBE participation will count toward the Department's federally-mandated statewide overall DBE goal.

Replace "offered" at the end of the 2nd sentence of item 7 in the list of 2nd paragraph of section 2-1.12B(3) with:

06-20-12

provided

Delete the 2nd paragraph of section 2-1.33A.

01-20-12

Replace the 3rd paragraph of section 2-1.33A with:

01-20-12

Except for each subcontracted bid item number and corresponding percentage and proof of each required SSPC QP certification, do not fax submittals.

Add to section 2-1.33C:

10-19-12

On the *Subcontractor List*, you must either submit each subcontracted bid item number and corresponding percentage with your bid or fax these numbers and percentages to (916) 227-6282 within 24 hours after bid opening. Failure to do so results in a nonresponsive bid.

Replace the paragraph in section 2-1.35 with:

01-20-12

Submit proof of each required SSPC QP certification with your bid or fax it to (916) 227-6282 no later than 4:00 p.m. on the 2nd business day after bid opening. Failure to do so results in a nonresponsive bid.

AA

3 CONTRACT AWARD AND EXECUTION

10-19-12

Add to the end of section 3-1.04:

10-19-12

You may request to extend the award period by faxing a request to (916) 227-6282 before 4:00 p.m. on the last day of the award period. If you do not make this request, after the specified award period:

1. Your bid becomes invalid
2. You are not eligible for the award of the contract

Replace the paragraph in section 3-1.11 with:

10-19-12

Complete and deliver to the Office Engineer a *Payee Data Record* when requested by the Department.

Replace section 3-1.13 with:

07-27-12

3-1.13 FORM FHWA-1273

For a federal-aid contract, form FHWA-1273 is included with the Contract form in the documents sent to the successful bidder for execution. Comply with its provisions. Interpret the training and promotion section as specified in section 7-1.11A.

Add to item 1 in the list in the 2nd paragraph of section 3-1.18:

07-27-12

, including the attached form FHWA-1273

Delete item 4 of the 2nd paragraph of section 3-1.18.

10-19-12

AA

5 CONTROL OF WORK

10-19-12

Add between "million" and ", professionally" in the 3rd paragraph of section 5-1.09A:

10-19-12

and 100 or more working days

Add to the list in the 4th paragraph of section 5-1.09A:

10-19-12

9. Considering discussing with and involving all stakeholders in evaluating potential VECs

Add to the end of item 1.1 in the list in the 7th paragraph of section 5-1.09A:

10-19-12

, including VECs

Replace the 1st paragraph of section 5-1.09C with:

10-19-12

For a contract with a total bid over \$10 million and 100 or more working days, training in partnering skills development is required.

10-19-12

Delete the 2nd paragraph of section 5-1.09C.

Replace "at least 2 representatives" in the 5th paragraph of section 5-1.09C with:

10-19-12

field supervisory personnel

Replace the 1st and 2nd sentences in the 7th paragraph of section 5-1.13B(1) with:

06-20-12

If a DBE is decertified before completing its work, the DBE must notify you in writing of the decertification date. If a business becomes a certified DBE before completing its work, the business must notify you in writing of the certification date.

Replace "90" in the last sentence of the 7th paragraph of section 5-1.13B(1) with:

06-20-12

30

Replace "Underutilized" in "Underutilized Disadvantaged Business Enterprises" in the heading of section 5-1.13B(2) with:

06-20-12

Performance of

06-20-12

Delete *U* in *UDBE* at each occurrence in section 5-1.13B(2).

Replace the 3rd paragraph of section 5-1.13B(2) with:

06-20-12

Do not terminate or substitute a listed DBE for convenience and perform the work with your own forces or obtain materials from other sources without authorization from the Department.

Replace item 6 in the list in the 4th paragraph of section 5-1.13B(2) with:

06-20-12

6. Listed DBE is ineligible to work on the project because of suspension or debarment.

Add to the list in the 4th paragraph of section 5-1.13B(2):

06-20-12

8. Listed DBE voluntarily withdraws with written notice from the Contract.
9. Listed DBE is ineligible to receive credit for the type of work required.
10. Listed DBE owner dies or becomes disabled resulting in the inability to perform the work on the Contract.
11. Department determines other documented good cause.

Add between the 4th and 5th paragraphs of section 5-1.13B(2):

07-20-12

Notify the original DBE of your intent to use other forces or material sources and provide the reasons. Provide the DBE with 5 days to respond to your notice and advise you and the Department of the reasons why the use of other forces or sources of materials should not occur. Your request to use other forces or material sources must include:

1. 1 or more of the reasons listed in the preceding paragraph
2. Notices from you to the DBE regarding the request
3. Notices from the DBE to you regarding the request

Add between "terminated" and ", you" in the 5th paragraph of section 5-1.13B(2):

07-20-12

or substituted

Replace "Contract" in item 1 in the list in the 5th paragraph of section 5-1.13C with:

10-19-12

work

Replace "Reserved" in section 5-1.20C with:

10-19-12

If the Contract includes an agreement with a railroad company, the Department makes the provisions of the agreement available in the *Information Handout* in the document titled "Railroad Relations and Insurance Requirements." Comply with the requirements in the document.

Add between the 2nd and 3rd paragraphs of section 5-1.23A:

10-19-12

Submit action and informational submittals to the Engineer.

Add to section 5-1.36C:

07-20-12

If the Contract does not include an agreement with a railroad company, do not allow personnel or equipment on railroad property.

Prevent material, equipment, and debris from falling onto railroad property.

Add between the 1st and 2nd paragraphs of section 5-1.37A:

10-19-12

Do not remove any padlock used to secure a portion of the work until the Engineer is present to replace it. Notify the Engineer at least 3 days before removing the lock.

Replace the 1st sentence of the 1st paragraph of section 5-1.39C(2) with:

10-19-12

Section 5-1.39C(2) applies if a plant establishment period of 3 years or more is shown on the *Notice to Bidders*.

Replace "working days" in the 1st paragraph of section 5-1.43E(1)(a) with:

10-19-12

original working days

^^

6 CONTROL OF MATERIALS

04-19-13

Replace section 6-2.05C with:

04-19-13

6-2.05C Steel and Iron Materials

Steel and iron materials must be melted and manufactured in the United States except:

1. Foreign pig iron and processed, pelletized, and reduced iron ore may be used in the domestic production of the steel and iron materials
2. If the total combined cost of the materials does not exceed the greater of 0.1 percent of the total bid or \$2,500, materials produced outside the United States may be used if authorized

Furnish steel and iron materials to be incorporated into the work with certificates of compliance and certified mill test reports. Mill test reports must indicate where the steel and iron were melted and manufactured.

All melting and manufacturing processes for these materials, including an application of a coating, must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

^^

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

07-27-12

Replace "20 days" in the 14th paragraph of section 7-1.04 with:

09-16-11

25 days

Replace "90 days" in the 14th paragraph of section 7-1.04 with:

09-16-11

125 days

Add between the 18th and 19th paragraphs of section 7-1.04:

09-16-11

Temporary facilities that could be a hazard to public safety if improperly designed must comply with design requirements described in the Contract for those facilities or, if none are described, with standard design criteria or codes appropriate for the facility involved. Submit shop drawings and design calculations for the temporary facilities and show the standard design criteria or codes used. Shop drawings and supplemental calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

Replace the 2nd paragraph of section 7-1.11A with:

07-27-12

A copy of form FHWA-1273 is included in section 7-1.11B. The training and promotion section of section II refers to training provisions as if they were included in the special provisions. The Department specifies the provisions in section 7-1.11D of the *Standard Specifications*. If a number of trainees or apprentices is required, the Department shows the number on the *Notice to Bidders*. Interpret each FHWA-1273 clause shown in the following table as having the same meaning as the corresponding Department clause:

FHWA-1273 Nondiscrimination Clauses

FHWA-1273 section	FHWA-1273 clause	Department clause
Training and Promotion	In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.	If section 7-1.11D applies, section 7-1.11D supersedes this subparagraph.
Records and Reports	If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.	If the Contract requires on-the-job training, collect and report training data.

Replace the form in section 7-1.11B with:

07-20-12

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contract). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers to any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

AA

8 PROSECUTION AND PROGRESS

10-19-12

Replace "working days" in the 1st paragraph of section 8-1.02B(1) with:

10-19-12

original working days

Replace "working days" at each occurrence in the 1st paragraph of section 8-1.02C(1) with:

10-19-12

original working days

04-20-12

Delete the 4th paragraph of section 8-1.02C(1).

Replace "Contract" in the 9th paragraph of section 8-1.02C(1) with:

10-19-12

work

Replace the 1st paragraph of section 8-1.02C(3)(a) with:

04-20-12

Submit a description of your proposed schedule software for authorization.

04-20-12

Delete the last paragraph of section 8-1.02C(3)(a).

Replace section 8-1.02C(3)(b) with:

10-19-12

8-1.02C(3)(b) Reserved

04-20-12

Delete the 3rd paragraph of section 8-1.02C(5).

Replace "Contract" in the last paragraph of section 8-1.02C(5) with:

10-19-12

original

Replace "working days" in the 1st paragraph of section 8-1.02D(1) with:

10-19-12

original working days

Replace "8-1.02D(1)" in the 2nd paragraph of section 8-1.02D(1) with:

01-20-12

8-1.02C(1)

Replace "Contract" in the 3rd paragraph of section 8-1.02D(2) with:

10-19-12

work

Replace "Contract" in item 9 in the list in the 4th paragraph of section 8-1.02D(4) with:

10-19-12

work

Replace "Contract completion" in the 4th paragraph of section 8-1.02D(6) with:

10-19-12

work completion

Replace "Contract working days" in the 4th paragraph of section 8-1.02D(6) with:

10-19-12

original working days

Delete items 1.3 and 1.4 in the list in the 1st paragraph of section 8-1.02D(10).

04-20-12

Replace the last paragraph of section 8-1.04B with:

10-19-12

The Department does not adjust time for starting before receiving notice of Contract approval.

Replace the 1st paragraph of section 8-1.05 with:

10-19-12

Contract time starts on the last day specified to start job site activities in section 8-1.04 or on the day you start job site activities, whichever occurs first.

Replace the 2nd paragraph of section 8-1.05 with:

10-19-12

Complete the work within the Contract time.

Delete "unless the Contract is suspended for reasons unrelated to your performance" in the 4th paragraph of section 8-1.05.

10-19-12

Replace the headings and paragraphs in section 8-1.06 with:

10-19-12

The Engineer may suspend work wholly or in part due to conditions unsuitable for work progress. Provide for public safety and a smooth and unobstructed passageway through the work zone during the suspension as specified under sections 7-1.03 and 7-1.04. Providing the passageway is force account work. The Department makes a time adjustment for the suspension due to a critical delay.

The Engineer may suspend work wholly or in part due to your failure to (1) fulfill the Engineer's orders, (2) fulfill a Contract part, or (3) perform weather-dependent work when conditions are favorable so that weather-related unsuitable conditions are avoided or do not occur. The Department may provide for a

smooth and unobstructed passageway through the work during the suspension and deduct the cost from payments. The Department does not make a time adjustment for the suspension.

Upon the Engineer's order of suspension, suspend work immediately. Resume work when ordered.

Replace the 1st sentence in the 1st paragraph of section 8-1.07B with:

10-19-12

For a critical delay, the Department may make a time adjustment.

Add to the end of section 8-1.07C:

10-19-12

The Department does not make a payment adjustment for overhead incurred during non-working days that extend the Contract into an additional construction season.

Replace the 1st paragraph of section 8-1.07C with:

10-19-12

For an excusable delay that affects your costs, the Department may make a payment adjustment.

Replace "8-1.08B and 8-1.08C" in the 1st paragraph of section 8-1.10A with:

08-05-11

8-1.10B and 8-1.10C

Replace section 8-1.10D with:

10-19-12

8-1.10D Reserved

AA

9 PAYMENT

01-18-13

Replace item 1 in the 3rd paragraph of section 9-1.03 with:

01-18-13

1. Full compensation for all work involved in each bid item shown on the Bid Item List by the unit of measure shown for that bid item

Replace "in" in the 3rd paragraph of section 9-1.04A with:

10-19-12

for

Add to the end of section 9-1.04A:

10-19-12

For nonsubcontracted work paid by force account for a contract with a TRO bid item, the markups are those shown in the following table instead of those specified in sections 9-1.04B–D:

Cost	Percent markup
Labor	30
Materials	10
Equipment rental	10

Delete ", Huntington Beach," in the 3rd paragraph of section 9-1.07A.

04-20-12

Replace the formula in section 9-1.07B(2) with:

$$Qh = HMATT \times Xa$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable *Xa* in section 9-1.07B(2) with:

total weight of HMA

04-20-12

Replace the formula in section 9-1.07B(3) with:

$$Qrh = RHMATT \times 0.80 \times Xarb$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable *Xarb* in section 9-1.07B(3) with:

total weight of rubberized HMA

04-20-12

Replace the heading of section 9-1.07B(4) with:

Hot Mix Asphalt with Modified Asphalt Binder

04-20-12

Add between "in" and "modified" in the introductory clause of section 9-1.07B(4):

HMA with

04-20-12

Replace the formula in section 9-1.07B(4) with:

$$Qmh = MHMATT \times [(100 - Xam) / 100] \times Xmab$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable *Xmab* in section 9-1.07B(4) with:

total weight of HMA

04-20-12

Replace the formula in section 9-1.07B(5) with:

$$Qrap = HMATT \times Xaa$$

04-20-12

Replace "weight of dry aggregate" in the definitions of the variables X_{aa} and X_{ta} in section 9-1.07B(5) with:

04-20-12

total weight of HMA

Add after the variable definitions in section 9-1.07B(9):

04-20-12

The quantity of extender oil is included in the quantity of asphalt.

Replace the headings and paragraphs in section 9-1.11 with:

10-19-12

9-1.11A General

Section 9-1.11 applies if a bid item for time-related overhead is included in the Contract. If a bid item for time-related overhead is included, you must exclude the time-related overhead from every other bid item price.

9-1.11B Payment Quantity

The TRO quantity does not include the number of working days to complete plant establishment work.

For a contract with a TRO lump sum quantity on the Bid Item List, the Department pays you based on the following conversions:

1. LS unit of measure is replaced with WDAY
2. Lump sum quantity is replaced with the number of working days bid
3. Lump sum unit price is replaced with the item total divided by the number of working days bid

9-1.11C Payment Inclusions

Payment for the TRO bid item includes payment for time-related field- and home-office overhead for the time required to complete the work.

The field office overhead includes time-related expenses associated with the normal and recurring construction activities not directly attributed to the work, including:

1. Salaries, benefits, and equipment costs of:
 - 1.1. Project managers
 - 1.2. General superintendents
 - 1.3. Field office managers
 - 1.4. Field office staff assigned to the project
2. Rent
3. Utilities
4. Maintenance
5. Security
6. Supplies
7. Office equipment costs for the project's field office

The home-office overhead includes the fixed general and administrative expenses for operating your business, including:

1. General administration
2. Insurance
3. Personnel and subcontract administration
4. Purchasing
5. Accounting
6. Project engineering and estimating

Payment for the TRO bid item does not include payment for:

1. The home-office overhead expenses specifically related to:
 - 1.1. Your other contracts or other businesses
 - 1.2. Equipment coordination
 - 1.3. Material deliveries
 - 1.4. Consultant and legal fees
2. Non-time-related costs and expenses such as mobilization, licenses, permits, and other charges incurred once during the Contract
3. Additional overhead involved in incentive/disincentive provisions to satisfy an internal milestone or multiple calendar requirements
4. Additional overhead involved in performing additional work that is not a controlling activity
5. Overhead costs incurred by your subcontractors of any tier or suppliers

9-1.11D Payment Schedule

For progress payments, the total work completed for the TRO bid item is the number of working days shown for the pay period on the *Weekly Statement of Working Days*.

For progress payments, the Department pays a unit price equal to the lesser of the following amounts:

1. Price per working day as bid or as converted under section 9-1.11B.
2. 20 percent of the total bid divided by the number of original working days

For a contract without plant establishment work, the Department pays you the balance due of the TRO item total as specified in section 9-1.17B.

For a contract with plant establishment work, the Department pays you the balance due of the TRO item total in the 1st progress payment after all non-plant establishment work is completed.

9-1.11E Payment Adjustments

The 3rd paragraph of section 9-1.17C does not apply.

The Department does not adjust the unit price for an increase or decrease in the TRO quantity except as specified in section 9-1.11E.

Section 9-1.17D(2)(b) does not apply except as specified for the audit report below.

If the TRO bid item quantity exceeds 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B, the Engineer may adjust or you may request an adjustment of the unit price for the excess quantity. For the adjustment, submit an audit report within 60 days of the Engineer's request. The report must be prepared as specified for an audit report for an overhead claim in section 9-1.17D(2)(b).

Within 20 days of the Engineer's request, make your financial records available for an audit by the State for the purpose of verifying the actual rate of TRO described in your audit. The actual rate of TRO described is subject to the Engineer's authorization.

The Department pays the authorized actual rate for TRO in excess of 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B.

The Department pays for 1/2 the cost of the report; the Contractor pays for the other 1/2. The cost is determined under section 9-1.05.

Delete "revised Contract" in item 1 of the 1st paragraph of section 9-1.16E(2).

10-19-12

Replace "2014" in the 1st paragraph of section 9-1.16F with:

10-19-12

2020

10-19-12

10-19-12

[illegible]

04-19-13

04-19-13

10-6.02 WATER-FILLED COFFERDAM

Reserved

10-6.03–10-6.10 RESERVED

10-7–10-20 RESERVED

AA

12 TEMPORARY TRAFFIC CONTROL

04-19-13

Replace the 1st paragraph of section 12-3.01A(4) with:

10-19-12

Category 2 temporary traffic control devices must be on FHWA's list of acceptable, crashworthy Category 2 hardware for work zones. This list is available on FHWA's Safety Program Web site.

Replace "project" in the 4th paragraph of section 12-3.02C with:

10-19-12

work

Add after "Display" in item 4 in the list in the 2nd paragraph of section 12-3.03B:

04-19-13

or Alternating Diamond

Replace "project" in the 3rd paragraph of section 12-3.07C with:

10-19-12

work

Replace the 3rd through 5th paragraphs of section 12-4.03 with:

04-19-13

Submit closure schedules using the Department's Internet-based LCS program to show the locations and times of the proposed closures.

The Department provides LCS training. Request LCS training at least 30 days before submitting the 1st lane closure request. The Department provides the training within 15 days after your request. The training may be web based.

Except for web-based training, the training is held at a time and location you and the Engineer agree to.

For web-based training, the Engineer provides you the website address to access the training.

Within 5 business days after completion of the training, the Department provides LCS accounts and user identifications to your assigned representatives.

Each representative must maintain a unique password and current user information in the LCS.

You will be notified through LCS of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

Submit closure schedule amendments using LCS, including adding additional closures, by noon at least 3 business days before a planned closure. Authorization of amendments will be at the discretion of the Engineer.

Cancel closure requests using LCS at least 48 hours before the time of the closure.

Add between the 7th and 8th paragraphs of section 12-4.03:

10-19-12

The contingency plan must identify the operations, equipment, processes, and materials that may fail and delay a reopening of a closure to traffic. List the additional or alternate equipment, materials, or workers necessary to ensure continuing operations and on-time opening of closures whenever a problem occurs. If the additional or alternate equipment, materials, or workers are not on site, specify their location, the method for mobilizing these items, and the required time to complete mobilization.

Based on the Engineer's review, additional materials, equipment, workers, or time to complete operations from that specified in the contingency plan may be required.

Provide a general time-scaled logic diagram displaying the major activities and sequence of planned operations that comply with the requirements of section 12-4.03. For each operation, identify the critical event when the contingency plan will be activated.

Submit any revisions to the contingency plan for an operation at least 3 business days before starting that operation. Do not close any lanes until the contingency plan has been authorized.

The 5th paragraph of section 5-1.23B(1) does not apply to reviewing contingency plans.

Replace section 12-7 with:

09-16-11

12-7 RESERVED

AA

13 WATER POLLUTION CONTROL

04-19-13

04-19-13

Delete item 3 in the list in the 4th paragraph of section 13-1.01A.

Add to section 13-1.01A:

01-20-12

Comply with the Department's general permit issued by the State Water Resources Control Board for *Order No. 99-06-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)*. The Department's general permit governs stormwater and nonstormwater discharges from the Department's properties, facilities, and activities. The Department's general permit may be viewed at the Web site for the State Water Resources Control Board, Storm Water Program, Caltrans General Permit.

Add to the list in the 1st paragraph of section 13-1.01D(3)(b):

10-21-11

3. Have completed SWRCB approved QSD training and passed the QSD exam

Add to the list in the 2nd paragraph of section 13-1.01D(3)(b):

10-21-11

3. Have completed SWRCB approved QSP training and passed the QSP exam

Replace "NEL violation" in item 3.6.2 in the list in the 1st paragraph of section 13-1.01D(3)(c) with:

04-19-13

receiving water monitoring trigger

Replace the 1st paragraph in section 13-2.01B with:

04-19-13

Within 7 days after Contract approval, submit 2 copies of your WPCP for review. Allow 5 business days for review.

After the Engineer authorizes the WPCP, submit an electronic copy and 3 printed copies of the authorized WPCP.

If the RWQCB requires review of the authorized WPCP, the Engineer submits the authorized WPCP to the RWQCB for its review and comment. If the Engineer orders changes to the WPCP based on the RWQCB's comments, amend the WPCP within 3 business days.

Replace the 1st paragraph in section 13-3.01B(2)(a) with:

04-19-13

Within 15 days of Contract approval, submit 3 copies of your SWPPP for review. The Engineer provides comments and specifies the date when the review stopped if revisions are required. Change and resubmit a revised SWPPP within 15 days of receiving the Engineer's comments. The Department's review resumes when a complete SWPPP has been resubmitted.

When the Engineer authorizes the SWPPP, submit an electronic copy and 4 printed copies of the authorized SWPPP.

If the RWQCB requires review of the authorized SWPPP, the Engineer submits the authorized SWPPP to the RWQCB for its review and comment. If the Engineer requests changes to the SWPPP based on the RWQCB's comments, amend the SWPPP within 10 days.

Replace "NELs" in item 3.1 in the 3rd paragraph of section 13-3.01B(2)(a) with:

04-19-13

receiving water monitoring triggers

Replace section 13-3.01B(6)(c) with:

04-19-13

13-3.01B(6)(c) Receiving Water Monitoring Trigger Report

Whenever a receiving water monitoring trigger is exceeded, notify the Engineer and submit a receiving water monitoring trigger report within 48 hours after conclusion of a storm event. The report must include:

1. Field sampling results and inspections, including:
 - 1.1. Analytical methods, reporting units, and detection limits
 - 1.2. Date, location, time of sampling, visual observation and measurements
 - 1.3. Quantity of precipitation from the storm event
2. Description of BMPs and corrective actions

Replace "NEL" in the 6th paragraph of section 13-3.01C(1) with:

04-19-13

receiving water monitoring trigger

Replace section 13-3.01C(3) with:

04-19-13

13-3.01C(3) Receiving Water Monitoring Trigger

For a risk level 3 project, receiving water monitoring triggers must comply with the values shown in the following table:

Receiving Water Monitoring Trigger

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Lower limit = 6.0 Upper limit = 9.0
Turbidity	Field test with calibrated portable instrument	1	NTU	500 NTU max

The storm event daily average for storms up to the 5-year, 24-hour storm must not exceed the receiving water monitoring trigger for turbidity.

The daily average sampling results must not exceed the receiving water monitoring trigger for pH.

Delete "and NELs are violated" in the 3rd paragraph of section 13-3.03C.

04-19-13

Replace "working days" at each occurrence in section 13-3.04 with.

original working days

10-19-12

Delete the 1st sentence in the 2nd paragraph of section 13-4.03C(3).

04-19-13

Add between the 2nd and 3rd paragraphs of section 13-4.03C(3):

Manage stockpiles by implementing water pollution control practices on:

04-19-13

1. Active stockpiles before a forecasted storm event
2. Inactive stockpiles according to the WPCP or SWPPP schedule

Replace the paragraph in section 13-4.04 with:

Not Used

04-20-12

Delete "or stockpile" in the 3rd paragraph of section 13-5.02F.

10-19-12

04-20-12

10-19-12

10-19-12

10-19-12

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10-19-12

10-19-12

AA

04-19-13

01-18-13

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5. Be fastened securely to the existing frame without projections above the surface of the road or into the clear opening

Add to the end of section 15-4.01A(2):

04-19-13

Allow 20 days for review of the bridge removal work plan.

Replace the 1st paragraph of section 15-5.01C(1) with:

10-19-12

Before starting deck rehabilitation activities, complete the removal of any traffic stripes, pavement markings, and pavement markers.

Replace the 2nd and 3rd paragraphs of section 15-5.01C(2) with:

10-19-12

Perform the following activities in the order listed:

1. Abrasive blast the deck surface with steel shot. Perform abrasive blasting after the removal of any unsound concrete and placement of any rapid setting concrete patches.
2. Sweep the deck surface.
3. Blow the deck surface clean using high-pressure air.

Replace the 2nd paragraph of section 15-5.01C(4) with:

10-19-12

Before removing asphalt concrete surfacing, verify the depth of the surfacing at the supports and midspans of each structure (1) in each shoulder, (2) in the traveled way, and (3) at the roadway crown, if a crown is present.

Delete "and concrete expansion dams" in the 3rd paragraph of section 15-5.01C(4).

04-19-13

Replace the 2nd paragraph of section 15-5.03A(2) with:

10-19-12

For a contract with less than 60 original working days, submit certificates of compliance for the filler material and bonding agents.

Replace "51-1.02C" in the 1st paragraph of section 15-5.03B with:

04-19-13

51-1.02F

Replace the 4th paragraph of section 15-5.03B with:

10-19-12

For a contract with less than 60 original working days, alternative materials must be authorized before use.

Add between the 5th and 6th paragraphs of section 15-5.03C:

The final surface finish of the patched concrete surface must comply with section 51-1.03F.

10-19-12

Delete the 4th paragraph of section 15-5.05C.

10-19-12

Replace "51-1.03F(5)" in the 3rd paragraph of section 15-5.06C(1) with:

51-1.01D(4)

10-19-12

Replace "51-1.03E(5)" in the 5th paragraph of section 15-5.06C(1) with:

51-1.03F(5)

10-19-12

Delete the 9th paragraph of section 15-5.06C(1).

10-19-12

Delete the 15th paragraph of section 15-5.06C(1).

04-19-13

Add to section 15-5.06C(1):

Texture the polyester concrete surface before gelling occurs by longitudinal tining under 51-1.03F(5)(b)(iii), except do not perform initial texturing.

10-19-12

Replace section 15-5.06C(2) with:

15-5.06C(2) Reserved

04-19-13

Delete the 3rd paragraph of section 15-5.06D.

04-19-13

Replace the 1st paragraph in section 15-5.07B(4) with:

Payment for furnishing dowels is not included in the payment for core and pressure grout dowel.

10-19-12

Replace section 15-5.09 with:

15-5.09 POLYESTER CONCRETE EXPANSION DAMS

04-19-13

15-5.09A General

Section 15-5.09 includes specifications for constructing polyester concrete expansion dams.

Polyester concrete expansion dams must comply with the specifications for polyester concrete overlays in section 15-5.06, except a trial slab is not required.

Reinforcement must comply with section 52.

15-5.09B Materials

Not Used

15-5.09C Construction

For new asphalt concrete overlays, place the asphalt concrete overlay before starting polyester concrete activities. Saw cut and remove asphalt concrete at expansion dam locations.

For existing asphalt concrete overlays, remove expansion dams and asphalt concrete to the limits shown. Removing expansion dams must comply with section 15-4 except a bridge removal work plan is not required.

Where a portion of the asphalt concrete overlay is to remain, saw cut a 2-inch-deep neat line along the edge to remain in place before removing the asphalt concrete. Do not damage the existing surfacing to remain in place.

Prepare the deck surface under section 15-5.01C(2).

You may use a mechanical mixer to mix the polyester concrete for expansion dams. The mixer capacity must not exceed 9 cu ft unless authorized. Initiate the resin and thoroughly blend it immediately before mixing it with the aggregate. Mix the polyester concrete for at least 2 minutes before placing.

The application rate of methacrylate resin must be approximately 100 sq ft/gal.

You may place and finish expansion dams using hand methods.

Protect expansion dams from moisture, traffic, and equipment for at least 4 hours after finishing.

For expansion dams over 6 feet long, install 1/4-inch-wide joint material at 6-foot intervals across the width of the expansion dam. Joint material must be either expanded polyurethane or expanded polyethylene.

15-5.09D Payment

Not Used

Replace the heading of section 15-6.04 with:

01-18-13

INVERT PAVING

AA

DIVISION III GRADING

19 EARTHWORK

04-19-13

Replace the 2nd paragraph of section 19-3.01A(2)(b) with:

07-01-11

For cofferdams on or affecting railroad property, allow 85 days for review.

Add to the list in the 1st paragraph of section 19-3.01A(2)(d):

01-20-12

9. Provisions for discontinuous rows of soil nails

Replace "sets" in the 3rd and 4th paragraphs of section 19-3.01A(2)(d) with:

04-19-13

copies

Add to section 19-3.01A(3)(b):

01-20-12

For soil nail walls, wall zones are specified in the special provisions.

For ground anchor walls, a wall zone is the entire wall unless otherwise specified in the special provisions.

Delete the 2nd sentence in the 4th paragraph of section 19-3.01A(3)(b).

01-20-12

Replace "90" in the paragraph of section 19-3.02G with:

01-18-13

90-1

Replace the heading of section 19-3.03C with:

04-19-13

19-3.03B(4) Cofferdams

Replace the heading of section 19-3.03D with:

04-19-13

19-3.03B(5) Water Control and Foundation Treatment

Replace the 1st paragraph of section 19-3.03E(3) with:

01-20-12

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

Replace the 2nd paragraph of section 19-3.03F with:

01-20-12

Do not backfill over or place material over slurry cement backfill until 4 hours after placement. When concrete sand is used as aggregate and the in-place material is free draining, you may start backfilling as soon as the surface water is gone.

Add between the 2nd and 3rd paragraphs of section 19-3.03K:

01-20-12

Before you excavate for the installation of ground anchors in a wall zone:

1. Complete stability testing
2. Obtain authorization of test data

Replace the 2nd sentence of the 7th paragraph of section 19-3.03K:

01-20-12

Stop construction in unstable areas until remedial measures have been taken. Remedial measures must be submitted and authorized.

Add between the 8th and 9th paragraphs of section 19-3.03K:

01-20-12

When your excavation and installation methods result in a discontinuous wall along any soil nail row, the ends of the structurally completed wall section must extend beyond the ends of the next lower excavation lift by a distance equal to twice the lift height. Maintain temporary slopes at the ends of each wall section to ensure slope stability.

Replace the 9th paragraph of section 19-3.03K:

01-20-12

Do not excavate to the next underlying excavation lift until the following conditions have been attained for the portion of the soil nail or ground anchor wall in the current excavation lift:

1. Soil nails or ground anchors are installed and grouted.
2. Reinforced shotcrete facing is constructed.
3. Grout and shotcrete have cured for at least 72 hours.
4. Specified tests are complete for that portion of wall and the results are authorized.
5. Soil nail facing anchorages are attached or ground anchors are locked off.

01-18-13

01-20-12

Replace the 2nd sentence in the 7th paragraph of section 19-3.04 with:

01-18-13

Structure excavation more than 0.5 foot from the depth shown is paid for as a work-character change if you request an adjustment or the Engineer orders an adjustment.

Replace "Contract completion time" in the 8th paragraph of section 19-6.03D with:

10-19-12

work completion date

Add to section 19:

01-18-13

19-10–19-20 RESERVED

AA

20 LANDSCAPE

10-19-12

10-19-12

Add "preparing holes," before "and" in the 1st paragraph of section 20-7.01A.

Replace "and handling" in the 1st paragraph of section 20-7.03A with:

10-19-12

handling, and preparing holes

Replace the 1st paragraph of section 20-7.03D with:

10-19-12

The location of all plants is as shown unless the Engineer designates otherwise. If the Engineer designates the location of plants, the location will be marked by stakes, flags, or other markers.

Replace item 1 in the list in the 1st paragraph of section 20-7.03I(1) with:

10-19-12

1. Preparing holes and planting plants

Delete "Prepare Hole," in the last paragraph of section 20-7.04.

10-19-12

AA

21 EROSION CONTROL

04-19-13

Replace ", bonded fiber matrix, and polymer-stabilized fiber matrix" in the 1st paragraph of section 21-1.01B with:

04-20-12

and bonded fiber matrix

Delete the last paragraph of section 21-1.02E.

04-20-12

Replace section 21-1.02F(2) with:

04-20-12

21-1.02F(2) Reserved

Replace section 21-1.02J with:

04-20-12

21-1.02J Reserved

Replace the row for organic matter content in the table in the 4th paragraph of section 21-1.02M with:

01-18-13

Organic matter content	TMECC 05.07-A Loss-on-ignition organic matter method (LOI) % dry weight basis	30–100
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10-19-12

Fiber roll must have a minimum functional longevity of 1 year.

01-18-13

Protect the traveled way, sidewalks, lined drainage channels, and existing vegetation from overspray of hydraulically-applied material.

01-18-13

04-19-13

04-20-12

10-19-12

01-18-13

[illegible]

2. Paving construction foreman
3. Traffic control foreman

Be prepared to discuss:

1. Quality control
2. Acceptance testing
3. Placement
4. Training on placement methods
5. Checklist of items for proper placement
6. Unique issues specific to the project, including:
 - 6.1. Weather
 - 6.2. Alignment and geometrics
 - 6.3. Traffic control issues
 - 6.4. Haul distances
 - 6.5. Presence and absence of shaded areas
 - 6.6. Any other local issues

37-1.02 MATERIALS

Not Used

37-1.03 CONSTRUCTION

Not Used

37-1.04 PAYMENT

Not Used

Replace "Reserved" in section 37-2.01D(1) with:

01-18-13

Aggregate suppliers, chip spreader operators, emulsion distributor, and for coated chips, the coated chips producer must attend the prepaving conference.

Add to section 37-2.03A:

04-20-12

If you fail to place the permanent traffic stripes and pavement markings within the specified time, the Department withholds 50 percent of the estimated value of the seal coat work completed that has not received permanent traffic stripes and pavement markings.

Add to section 37-3.01D(1):

01-18-13

Micro-surfacing spreader operators must attend the prepaving conference.

AA

39 HOT MIX ASPHALT

02-22-13

Add to section 39-1.01B:

02-22-13

processed RAP: RAP that has been fractionated.

substitution rate: Amount of RAP aggregate substituted for virgin aggregate in percent.

binder replacement: Amount of RAP binder in OBC in percent.

surface course: Upper 0.2 feet of HMA exclusive of OGFC.

Add to the end of the paragraph in section 39-1.02A:

10-19-12

as shown

Replace the paragraphs in section 39-1.02F with:

02-22-13

39-1.02F(1) General

You may produce HMA Type A or B using RAP. HMA produced using RAP must comply with the specifications for HMA, except aggregate quality specifications do not apply to RAP. You may substitute RAP at a substitution rate not exceeding 25 percent of the aggregate blend. Do not use RAP in OGFC and RHMA-G.

Assign the substitution rate of RAP aggregate for virgin aggregate with the JMF submittal. The JMF must include the percent of RAP used.

Provide enough space for meeting RAP handling requirements at your facility. Provide a clean, graded, well-drained area for stockpiles. Prevent material contamination and segregation.

If RAP is from multiple sources, blend the RAP thoroughly and completely. RAP stockpiles must be homogeneous.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

AASHTO T 324 (Modified) is AASHTO T 324, "Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)," with the following parameters:

1. Target air voids must equal 7 ± 1 percent
2. Number of test specimens must be 4
3. Test specimen must be a 6-inch gyratory compacted specimen
4. Test temperature must be set at 140 ± 2 degrees F
5. Measurements for impression must be taken at every 100 passes
6. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
7. Testing shut off must be set at 25,000 passes

39-1.02F(2) Substitution Rate of 15 Percent or Less

For a RAP substitution rate of 15 percent or less, you may stockpile RAP during the entire project.

39-1.02F(3) Substitution Rate Greater than 15 Percent

For a RAP substitution rate greater than 15 percent, fractionate RAP into 2 sizes, a coarse fraction RAP retained on 1/4-inch screen and a fine fraction RAP passing 1/4-inch screen.

Sample and test processed RAP at a minimum frequency of 1 sample per 1000 tons with a minimum of 6 samples for each processed RAP stockpile. The asphalt binder content and specific gravity must meet the processed RAP quality characteristics. If a processed RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

The processed RAP asphalt binder content must be within ± 2.0 percent of the average processed RAP stockpile asphalt binder content when tested under ASTM D 2172, Method B. If a new processed RAP stockpile is required, the average binder content of the new processed RAP stockpile must be within ± 2.0 percent of the average binder content of the original processed RAP stockpile.

The maximum specific gravity for processed RAP must be within ± 0.06 when tested under California Test 309 of the average maximum specific gravity reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form.

Replace "less than 10 percent" in note "b" in the table in the 5th paragraph of section 39-1.02E with:

01-20-12

10 percent or less

Replace items 7 and 8 in the 5th paragraph of section 39-1.03A with:

02-22-13

7. Substitution rate by more than 5 percent if your assigned RAP substitution rate is 15 percent or less
8. Substitution rate by more than 3 percent if your assigned RAP substitution rate is greater than 15 percent
9. Average binder content by more than 2 percent from the average binder content of the original processed RAP stockpile used in the mix design
10. Maximum specific gravity of processed RAP by more than ± 0.060 from the average maximum specific gravity of processed RAP reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form
11. Any material in the JMF

Replace the 1st paragraph of section 39-1.03B with:

02-22-13

Perform a mix design that produces HMA with the values for the quality characteristics shown in the following table:

HMA Mix Design Requirements

Quality characteristic	Test method	HMA type		
		A	B	RHMA-G
Air void content (%)	California Test 367	4.0	4.0	Section 39-1.03B
Voids in mineral aggregate (% min.) No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	17.0	17.0	--
		15.0	15.0	--
		14.0	14.0	18.0–23.0
		13.0	13.0	18.0–23.0
Voids filled with asphalt (%) No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	65.0–75.0	65.0–75.0	Note a
		65.0–75.0	65.0–75.0	
		65.0–75.0	65.0–75.0	
		65.0–75.0	65.0–75.0	
Dust proportion No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.6–1.2	0.6–1.2	Note a
		0.6–1.2	0.6–1.2	
Stabilometer value (min.) No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30	30	--
		37	35	23

^a Report this value in the JMF submittal.

For RAP substitution rate greater than 15 percent, the mix design must comply with the additional quality characteristics shown in the following table:

**Additional HMA Mix Design Requirements
for RAP Substitution Rate Greater Than 15 Percent**

Quality characteristic	Test method	HMA type		
		A	B	RHMA-G
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth)	AASHTO T 324 (Modified) ^a			
PG-58		10,000	10,000	--
PG-64		15,000	15,000	
PG-70		20,000	20,000	
PG-76 or higher		25,000	25,000	
Hamburg wheel track (inflection point minimum number of passes)	AASHTO T 324 (Modified) ^a			
PG-58		10,000	10,000	--
PG-64		10,000	10,000	
PG-70		12,500	12,500	
PG-76 or higher		15000	15000	
Moisture susceptibility (minimum dry strength, psi)	California Test 371 ^a	120	120	--
Moisture susceptibility (tensile strength ration, %)	California Test 371 ^a	70	70	--

^aTest plant produced HMA.

For HMA with RAP, the maximum binder replacement must be 25.0 percent of OBC for surface course and 40.0 percent of OBC for lower courses.

For HMA with a binder replacement less than or equal to 25 percent of OBC, you may request that the PG asphalt binder grade with upper and lower temperature classifications be reduced by 6 degrees C from the specified grade.

For HMA with a binder replacement greater than 25 percent but less than or equal to 40 percent of OBC, you must use a PG asphalt binder grade with upper and lower temperature classifications reduced by 6 degrees C from the specified grade.

Replace item 4 in the list in the 1st paragraph of section 39-1.03C with:

01-20-12

4. JMF renewal on a *Caltrans Job Mix Formula Renewal* form, if applicable

Add after the last paragraph of section 39-1.03C:

02-22-13

For RAP substitution rate greater than 15 percent, submit with the JMF submittal:

1. California Test 371 tensile strength ratio and minimum dry strength test results
2. AASHTO T 324 (Modified) test results

For RAP substitution rate greater than 15 percent, submit California Test 371 and AASHTO T 324 (Modified) test results to the Engineer and to:

Moisture_Tests@dot.ca.gov

Replace the 2nd paragraph of section 39-1.03E with:

04-20-12

Use the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form. No adjustments to asphalt binder content are allowed. Based on your testing and production experience, you may submit an adjusted aggregate gradation TV on a *Contractor Job Mix Formula Proposal* form before verification testing. Aggregate gradation TV must be within the TV limits specified in the aggregate gradation tables.

Add between the 3rd and 4th paragraphs of section 39-1.03E:

04-20-12

Asphalt binder set point for HMA must be the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form. When RAP is used, asphalt binder set point for HMA must be:

$$\text{Asphalt Binder Set Point} = \frac{\frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)} - R_{RAP} \left[\frac{BC_{RAP}}{\left(1 - \frac{BC_{RAP}}{100}\right)} \right]}{100 + \frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)}}$$

Where:

BC_{OBC} = optimum asphalt binder content, percent based on total weight of mix

R_{RAP} = RAP ratio by weight of aggregate

BC_{RAP} = asphalt binder content of RAP, percent based on total weight of RAP mix

Replace item 4 in the list in the 8th paragraph of section 39-1.03E with:

04-20-12

4. HMA quality specified in the table titled "HMA Mix Design Requirements" except:
 - 4.1. Air void content, design value ± 2.0 percent
 - 4.2. Voids filled with asphalt, report only
 - 4.3. Dust proportion, report only

Replace the 12th paragraph of section 39-1.03E with:

04-20-12

If tests on plant-produced samples do not verify the JMF, the Engineer notifies you and you must submit a new JMF or submit an adjusted JMF based on your testing. JMF adjustments may include a change in aggregate gradation TV within the TV limits specified in the aggregate gradation tables.

Replace the 14th paragraph of section 39-1.03E with:

01-20-12

A verified JMF is valid for 12 months.

Replace the last sentence in the 15th paragraph of section 39-1.03E with:

01-20-12

This deduction does not apply to verifications initiated by the Engineer or JMF renewal.

Replace the 16th paragraph of section 39-1.03E with:

02-22-13

Except for RAP substitution rate greater than 15 percent, for any HMA produced under the QC/QA process the Department does not use California Test 371 test results for verification.

Add between the 1st and 2nd paragraphs of section 39-1.03F:

04-20-12

Target asphalt binder content on your Contractor *Job Mix Formula Proposal* form and the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form must be the same.

Delete the 4th paragraph of section 39-1.03F.

01-20-12

Replace items 3 and 5 in the list in the 6th paragraph of section 39-1.03F with:

01-20-12

3. Engineer verifies each proposed JMF renewal within 20 days of receiving verification samples.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at the Department's expense 1 proposed JMF renewal within a 12-month period.

Add between the 6th and 7th paragraphs of section 39-1.03F:

01-20-12

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or the Engineer may perform aggregate quality tests for verification of JMF renewal.

Replace section 39-1.03G with:

04-20-12

39-1.03G Job Mix Formula Modification

For an accepted JMF, you may change asphalt binder source one time during production.

Submit your modified JMF request a minimum of 3 business days before production. Each modified JMF submittal must consist of:

1. Proposed modified JMF on *Contractor Job Mix Formula Proposal* form
2. Mix design records on *Contractor Hot Mix Asphalt Design Data* form for the accepted JMF to be modified
3. JMF verification on *Hot Mix Asphalt Verification* form for the accepted JMF to be modified
4. Quality characteristics test results for the modified JMF as specified in section 39-1.03B. Perform tests at the mix design OBC as shown on the *Contractor Asphalt Mix Design Data* form
5. If required, California Test 371 test results for the modified JMF.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 5 business days of receiving all verification samples. If California Test 371 is required, the Engineer tests for California Test 371 within 10 days of receiving verification samples.

The Engineer verifies the modified JMF after the modified JMF HMA is placed on the project and verification samples are taken within the first 750 tons following sampling requirements in section 39-1.03E, "Job Mix Formula Verification." The Engineer tests verification samples for compliance with:

1. Stability as shown in the table titled "HMA Mix Design Requirements"
2. Air void content at design value ± 2.0 percent
3. Voids in mineral aggregate as shown in the table titled "HMA Mix Design Requirements"
4. Voids filled with asphalt, report only

5. Dust proportion, report only

If the modified JMF is verified, the Engineer revises your *Hot Mix Asphalt Verification* form to include the new asphalt binder source. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected.

The Engineer deducts \$2,000 from payments for each modified JMF verification. The Engineer deducts an additional \$2,000 for each modified JMF verification that requires California Test 371.

Add to section 39-1.03:

01-20-12

39-1.03H Job Mix Formula Acceptance

You may start HMA production if:

1. The Engineer's review of the JMF shows compliance with the specifications.
2. The Department has verified the JMF within 12 months before HMA production.
3. The Engineer accepts the verified JMF.

Replace "3 days" in the 1st paragraph of section 39-1.04A with:

01-20-12

3 business days

Replace the 2nd sentence in the 2nd paragraph of section 39-1.04A with:

01-20-12

During production, take samples under California Test 125. You may sample HMA from:

Replace the 2nd paragraph of section 39-1.04E with:

02-22-13

For RAP substitution rate of 15 percent or less, sample RAP once daily.

For RAP substitution rate of greater than 15percent, sample processed RAP twice daily.

Perform QC testing for processed RAP aggregate gradation under California Test 367, appendix B, and submit the results with the combined aggregate gradation.

Replace "5 days" in the 1st paragraph of section 39-1.06 with:

01-20-12

5 business days

Replace the 3rd paragraph of section 39-1.08A with:

04-20-12

During production, you may adjust hot or cold feed proportion controls for virgin aggregate and RAP.

Add to section 39-1.08A:

04-20-12

During production, asphalt binder set point for HMA Type A, HMA Type B, HMA Type C, and RHMA-G must be the OBC shown in *Contractor Hot Mix Asphalt Design Data* form. For OGFC, asphalt binder set

point must be the OBC shown on *Caltrans Hot Mix Asphalt Verification* form. If RAP is used, asphalt binder set point for HMA must be calculated as specified in section 39-1.03E.

02-22-13

For RAP substitution rate of 15 percent or less, you may adjust the RAP by ± 5 percent.

For RAP substitution greater than 15, you may adjust the RAP by ± 3 percent.

04-20-12

You must request adjustments to the plant asphalt binder set point based on new RAP stockpiles average asphalt binder content. Do not adjust the HMA plant asphalt binder set point until authorized.

Replace the 3rd paragraph of section 39-1.08B with:

09-16-11

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

Replace section 39-1.11 with:

01-18-13

39-1.11 CONSTRUCTION

39-1.11A General

Do not place HMA on wet pavement or a frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pickup, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

39-1.11B Longitudinal Joints

39-1.11B(1) General

Longitudinal joints in the top layer must match specified lane edges. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the specified lane edges. You may request other longitudinal joint placement patterns.

A vertical longitudinal joint of more than 0.15 ft is not allowed at any time between adjacent lanes open to traffic.

For HMA thickness of 0.15 ft or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For HMA thickness greater than 0.15 ft, you must place HMA on adjacent traveled way lanes so that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place Kraft paper or another authorized bond breaker under the conform tapers to facilitate the taper removal when paving operations resume.

39-1.11B(2) Tapered Notched Wedge

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.

The tapered notched wedge must retain its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

Perform QC testing on the completed tapered notch wedge joint as follows:

1. Perform field compaction tests at the rate of 1 test for each 750-foot section along the joint. Select random locations for testing within each 750-foot section.
2. Perform field compaction tests at the centerline of the joint, 6 inches from the upper vertical notch, after the adjacent lane is placed and before opening the pavement to traffic.
3. Determine maximum density test results.
4. Determine percent compaction of the longitudinal joint as the ratio of the average of the field compaction values and the maximum density test results.

For HMA under QC/QA construction process, the additional quality control compaction results associated with the tapered notch wedge will not be included in the computation of any quality factor and process control.

For acceptance of the completed tapered notch wedge joint, take two 4- or 6-inch diameter cores 6 inches from the upper vertical notch of the completed longitudinal joint for every 3,000 feet at locations designated by the Engineer. Take cores after the adjacent lane is placed and before opening the pavement to traffic. Cores must be taken in the presence of the Engineer and must be marked to identify the test sites. Submit the cores. One core will be used for determination of the field density and 1 core will be used for dispute resolution. The Engineer determines:

1. Field compaction by measuring the bulk specific gravity of the cores under California Test 308, Method A
2. Percent compaction as the ratio of the average of the bulk specific gravity of the core for each day's production to the maximum density test value

For HMA under QC/QA construction process, the additional quality assurance testing by the Engineer to determine field compaction associated with the tapered notch wedge will not be included in the Engineer's verification testing and in the computation of any quality factor and process control.

Determine percent compaction values each day the joint is completed and submit values within 24 hours of testing. If the percent compaction of 1 day's production is less than 91 percent, that day's notched wedge joint is rejected. Discontinue placement of the tapered notched wedge and notify the Engineer of changes you will make to your construction process in order to meet the specifications.

For HMA under QC/QA construction process, quantities of HMA placed in the completed longitudinal joint will have a quality factor QF_{QC5} of 1.0.

39-1.11C Widening Existing Pavement

If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

39-1.11D Shoulders, Medians, and Other Road Connections

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

39-1.11E Leveling

If leveling with HMA is specified, fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as HMA (leveling).

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material.

39-1.11F Compaction

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving. Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder
3. Below 200 degrees F for RHMA-G

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not use a pneumatic-tired roller to compact RHMA-G.

For Standard and QC/QA construction processes, if 3/4-inch aggregate grading is specified, you may use a 1/2-inch aggregate grading if the specified total paved thickness is at least 0.15 foot and less than 0.20 foot thick.

Spread and compact HMA under sections 39-3.03 and 39-3.04 if any of the following applies:

1. Specified paved thickness is less than 0.15 foot.
2. Specified paved thickness is less than 0.20 foot and 3/4-inch aggregate grading is specified and used.
3. You spread and compact at:
 - 3.1. Asphalt concrete surfacing replacement areas
 - 3.2. Leveling courses
 - 3.3. Areas for which the Engineer determines conventional compaction and compaction measurement methods are impeded

Do not open new HMA pavement to public traffic until its mid-depth temperature is below 160 degrees F.

If you request and if authorized, you may cool HMA Type A and Type B with water when rolling activities are complete. Apply water under section 17-3.

Spread sand at a rate from 1 to 2 lb/sq yd on new RHMA-G, RHMA-O, and RHMA-O-HB pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(4)(c). Keep traffic off the pavement until spreading sand is complete.

Replace the 5th and 6th paragraphs of section 39-1.12C with:

07-20-12

On tangents and horizontal curves with a centerline radius of curvature 2,000 feet or more, the PI_0 must be at most 2.5 inches per 0.1-mile section.

On horizontal curves with a centerline radius of curvature between 1,000 feet and 2,000 feet including pavement within the superelevation transitions, the PI_0 must be at most 5 inches per 0.1-mile section.

Add to section 39-1.12:

01-20-12

39-1.12E Reserved

Add to section 39-1.14:

01-20-12

Prepare the area to receive HMA for miscellaneous areas and dikes, including any excavation and backfill as needed.

Replace "6.8" in item 3 in the list in the 4th paragraph of section 39-1.14 with:

04-20-12

6.4

Replace "6.0" in item 3 in the list in the 4th paragraph of section 39-1.14 with:

04-20-12

5.7

Replace "6.8" in the 1st paragraph of section 39-1.15B with:

04-20-12

6.4

Replace "6.0" in the 1st paragraph of section 39-1.15B with:

04-20-12

5.7

Replace the 1st paragraph of section 39-2.02B with:

02-22-13

Perform sampling and testing at the specified frequency for the quality characteristics shown in the following table:

Minimum Quality Control—Standard Construction Process

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA type			
			A	B	RHMA-G	OGFC
Aggregate gradation ^a	California Test 202	1 per 750 tons and any remaining part at the end of the project	JMF ± Tolerance ^b	JMF ± Tolerance ^b	JMF ± Tolerance ^b	JMF ± Tolerance ^b
Sand equivalent (min) ^c	California Test 217		47	42	47	--
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (% max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density) ^{d,e}	QC plan	2 per business day (min.)	91–97	91–97	91–97	--
Stabilometer value (min) ^c No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	1 per 4,000 tons or 2 per 5 business days, whichever is greater	30	30	--	--
			37	35	23	--
Air void content (%) ^{c, f}	California Test 367		4 ± 2	4 ± 2	TV ± 2	--
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants ^g	California Test 226 or 370	2 per day during production	--	--	--	--
Percent of crushed particles coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	As designated in the QC plan. At least once per project	90	25	--	90
			75	--	90	75
			70	20	70	90
Los Angeles Rattler (% max) Loss at 100 rev.	California Test 211		12	--	12	12

Loss at 500 rev.			45	50	40	40
Flat and elongated particles (% max by weight @ 5:1)	California Test 235		Report only	Report only	Report only	Report only
Fine aggregate angularity (% min) ^h	California Test 234		45	45	45	--
Voids filled with asphalt (%) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0	--
Dust proportion ^l No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367		0.6-1.2 0.6–1.2	0.6-1.2 0.6–1.2	Report only	--
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) ^j PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is more	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--	--
Hamburg wheel track (inflection point minimum number of passes) ^j PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is more	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--
Moisture susceptibility (minimum dry strength, psi) ^j	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--
Moisture susceptibility (tensile strength ratio, %) ^j	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1	70	70	--	--

		per project whichever is greater				
Smoothness	Section 39-1.12	--	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	Section 39-1.04C	--	--	1,500– 4,000	1,500– 4,000
Asphalt modifier	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D

^a Determine combined aggregate gradation containing RAP under California Test 367.

^b The tolerances must comply with the allowable tolerances in section 39-1.02E.

^c Report the average of 3 tests from a single split sample.

^d Determine field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^e To determine field compaction use:

1. In-place density measurements using the method specified in your QC plan.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^f Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

^g For adjusting the plant controller at the HMA plant.

^h The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

ⁱ Report only.

^j Applies to RAP substitution rate greater than 15 percent.

Replace the 1st paragraph of section 39-2.03A with:

02-22-13

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Standard Construction Process

Quality characteristic				Test method	HMA type			
					A	B	RHMA-G	OGFC
Aggregate gradation ^a				California Test 202	JMF ± tolerance ^c	JMF ± tolerance ^c	JMF ± tolerance ^c	JMF ± tolerance ^c
Sieve	3/4"	1/2"	3/8"					
1/2"	X ^b							
3/8"		X						
No. 4			X					
No. 8	X	X	X					
No. 200	X	X	X					
Sand equivalent (min) ^d				California Test 217	47	42	47	--
Asphalt binder content (%)				California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (% , max)				California Test 226 or 370	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density) ^{e, f}				California Test 375	91–97	91–97	91–97	--
Stabilometer value (min) ^d , No. 4 and 3/8" gradings 1/2" and 3/4" gradings				California Test 366	30 37	30 35	-- 23	-- --
Air void content (%) ^{d, g}				California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Percent of crushed particles Coarse aggregate (% , min) One fractured face Two fractured faces Fine aggregate (% , min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face				California Test 205	90 75 70	25 -- 20	-- 90 70	90 75 90
Los Angeles Rattler (% , max) Loss at 100 rev. Loss at 500 rev.				California Test 211	12 45	-- 50	12 40	12 40
Fine aggregate angularity (% , min) ^h				California Test 234	45	45	45	--
Flat and elongated particles (% , max by weight @ 5:1)				California Test 235	Report only	Report only	Report only	Report only
Voids filled with asphalt (%) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading				California Test 367	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading				California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0	--
Dust proportion ⁱ				California			Report only	--

No. 4 and 3/8" gradings 1/2" and 3/4" gradings	Test 367	0.6-1.2 0.6-1.2	0.6-1.2 0.6-1.2		
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) ^j PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--	--
Hamburg wheel track (inflection point minimum number of passes) ^j PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--
Moisture susceptibility (minimum dry strength, psi) ^j	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ratio, %) ^j	California Test 371	70	70	--	--
Smoothness	Section 39-1.12	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge and must grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt rubber binder	Various	--	--	Section 92- 1.01D(2) and section 39-1.02D	Section 92-1.01D(2) and section 39-1.02D
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.

^b "X" denotes the sieves the Engineer tests for the specified aggregate gradation.

^c The tolerances must comply with the allowable tolerances in section 39-1.02E.

^d The Engineer reports the average of 3 tests from a single split sample.

^e The Engineer determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^f To determine field compaction, the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^g The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

^h The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

ⁱ Report only.

^j Applies to RAP substitution rate greater than 15 percent.

Replace the 5th paragraph of section 39-2.03A with:

01-20-12

The Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.2 foot and any layer is less than 0.20 foot.

Replace the 1st paragraph of section 39-3.02A with:

02-22-13

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Method Construction Process

Quality characteristic	Test method	HMA type			
		A	B	RHMA-G	OGFC
Aggregate gradation ^a	California Test 202	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b
Sand equivalent (min) ^c	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (% max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Stabilometer value (min) ^c No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30 37	30 35	-- 23	-- --
Percent of crushed particles Coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	90 75 70	25 -- 20	-- 90 70	90 75 90
Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.	California Test 211	12 45	-- 50	12 40	12 40
Air void content (%) ^{c, d}	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min) ^e	California Test 234	45	45	45	--
Flat and elongated particles (% max by weight @ 5:1)	California Test 235	Report only	Report only	Report only	Report only
Voids filled with asphalt (%) ^f No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ^f No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0	--
Dust proportion ^g No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.6–1.2 0.6–1.2	0.6–1.2 0.6–1.2	Report only	--
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) ^g PG-58 PG-64	AASHTO T 324 (Modified)	10,000 15,000	10,000 15,000	--	--

PG-70 PG-76 or higher		20,000 25,000	20,000 25,000		
Hamburg wheel track (inflection point minimum number of passes) ^g PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--
Moisture susceptibility (minimum dry strength, psi) ^g	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ration, %) ^g	California Test 371	70	70	--	--
Smoothness	Section 39-1.12	12-foot straight- edge and must-grind	12-foot straight- edge and must-grind	12-foot straight- edge and must-grind	12-foot straight- edge and must-grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt rubber binder	Various	--	--	Section 92- 1.01D(2) and section 39-1.02D	Section 92- 1.01D(2) and section 39-1.02D
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.

^b The tolerances must comply with the allowable tolerances in section 39-1.02E.

^c The Engineer reports the average of 3 tests from a single split sample.

^d The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

^e The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^f Report only.

^g Applies to RAP substitution rate greater than 15 percent.

Replace "280 degrees F" in item 2 in the list in the 6th paragraph of section 39-3.04 with:

285 degrees F

01-20-12

Replace "5,000" in the 5th paragraph of section 39-4.02C with:

10,000

02-22-13

Replace the 7th paragraph of section 39-4.02C with:

Except for RAP substitution rate of greater than 15 percent, the Department does not use results from California Test 371 to determine specification compliance.

02-22-13

Replace the 8th paragraph of section 39-4.02C with:

02-22-13

Comply with the values for the HMA quality characteristics and minimum random sampling and testing for quality control shown in the following table:

Minimum Quality Control—QC/QA Construction Process

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA Type			Location of sampling	Maximum report-ing time allowance
			A	B	RHMA-G		
Aggregate gradation ^a	California Test 202	1 per 750 tons	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b	California Test 125	24 hours
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ±0.40	Loose mix behind paver See California Test 125	
Field compaction (% max. theoretical density) ^{c,d}	QC plan		92–96	92–96	91–96	QC plan	
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants ^e	California Test 226 or 370	2 per day during production	--	--	--	Stock-piles or cold feed belts	--
Sand equivalent (min) ^f	California Test 217	1 per 750 tons	47	42	47	California Test 125	24 hours
HMA moisture content (% max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	Loose Mix Behind Paver See California Test 125	24 hours
Stabilometer value (min) ^f	California Test 366	1 per 4,000 tons or 2 per 5 business days, whichever is greater	30	30	--		48 hours
No. 4 and 3/8" gradings 1/2" and 3/4" gradings			37	35	23		
Air void content (%) ^{f,g}	California Test 367		4 ± 2	4 ± 2	TV ± 2		

Percent of crushed particles coarse aggregate (% min.): One fractured face Two fractured faces	California Test 205	As designated in QC plan. At least once per project.	90	25	--	California Test 125	48 hours
Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve): One fractured face			75	--	90		
			70	20	70		
Los Angeles Rattler (% max): Loss at 100 rev. Loss at 500 rev.	California Test 211		12	--	12	California Test 125	
			45	50	40		
Fine aggregate angularity (% min) ⁿ	California Test 234		45	45	45	California Test 125	
Flat and elongated particle (% max by weight @ 5:1)	California Test 235		Report only	Report only	Report only	California Test 125	
Voids filled with asphalt (%) ⁱ	California Test 367				Report only		
No. 4 grading 3/8" grading 1/2" grading 3/4" grading			65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0			
Voids in mineral aggregate (% min.) ⁱ	California Test 367						
No. 4 grading 3/8" grading 1/2" grading 3/4" grading			17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0		

Dust proportion ⁱ	California Test 367						
No. 4 and 3/8" gradings			0.6–1.2	0.6–1.2	Report only		
1/2" and 3/4" gradings			0.6–1.2	0.6–1.2			
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) ⁱ	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is greater			--	--	
PG-58			10,000	10,000			
PG-64			15,000	15,000			
PG-70			20,000	20,000			
PG-76 or higher			25,000	25,000			
Hamburg wheel track (inflection point minimum number of passes) ⁱ	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is greater			--	--	
PG-58			10,000	10,000			
PG-64			10,000	10,000			
PG-70			12,500	12,500			
PG-76 or higher			15000	15000			
Moisture susceptibility (minimum dry strength, psi) ^j	California Test 371	1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--	
Moisture susceptibility (tensile strength ratio, %) ^j	California Test 371	1 per 10,000 tons or 1 per project whichever is greater	70	70	70	--	
Smoothness	Section 39-1.12	--	12-foot straight-edge, must-grind, and Pl ₀	12-foot straight-edge, must-grind, and Pl ₀	12-foot straight-edge, must-grind, and Pl ₀	--	
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	--	--	--	1,500–4,000	Section 39-1.02D	24 hours
CRM	Section 39-1.02D	--	--	--	Section 39-1.02D	Section 39-1.02D	48 hours

- ^a Determine combined aggregate gradation containing RAP under California Test 367.
- ^b The tolerances must comply with the allowable tolerances in section 39-1.02E.
- ^c Determines field compaction for any of the following conditions:
 1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
 2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.
- ^d To determine field compaction use:
 1. In-place density measurements using the method specified in your QC plan.
 2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.
- ^e For adjusting the plant controller at the HMA plant.
- ^f Report the average of 3 tests from a single split sample.
- ^g Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
- ^h The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.
- ⁱ Report only.
- ^j Applies to RAP substitution rate greater than 15 percent.

Replace the 1st sentence in the 1st paragraph of section 39-4.03B(2) with:

01-20-12

For aggregate gradation and asphalt binder content, the minimum ratio of verification testing frequency to quality control testing frequency is 1:5.

Replace the 2nd "and" in the 7th paragraph of section 39-4.03B(2) with:

01-20-12

or

Replace the 1st paragraph of section 39-4.04A with:

02-22-13

The Engineer samples for acceptance testing and tests for the following quality characteristics:

HMA Acceptance—QC/QA Construction Process

Index (i)	Quality characteristic				Weight -ing factor (w)	Test method	HMA type			
							A	B	RHMA-G	
		Aggregate gradation ^a				California Test 202	JMF ± Tolerance ^c			
	Sieve	3/4"	1/2"	3/8"						
1	1/2"	X ^b	--	--						0.05
1	3/8"	--	X	--						0.05
1	No. 4	--	--	X						0.05
2	No. 8	X	X	X						0.10
3	No. 200	X	X	X						0.15
4	Asphalt binder content (%)				0.30	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	
5	Field compaction (% max. theoretical density) ^{d, e}				0.40	California Test 375	92–96	92–96	91–96	
	Sand equivalent (min) ^f					California Test 217	47	42	47	
	Stabilometer value (min) ^f No. 4 and 3/8" gradings 1/2" and 3/4" gradings					California Test 366	30 37	30 35	-- 23	
	Air void content (%) ^{f, g}					California Test 367	4 ± 2	4 ± 2	TV ± 2	
	Percent of crushed particles coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on No. 8 sieve.) One fractured face					California Test 205	90 75	25 --	-- 90	
	HMA moisture content (%, max)					California Test 226 or 370	1.0	1.0	1.0	
	Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.					California Test 211	12 45	-- 50	12 40	
	Fine aggregate angularity (% min) ^h					California Test 234	45	45	45	
	Flat and elongated particle (% max by weight @ 5:1)					California Test 235	Report only	Report only	Report only	
	Voids in mineral aggregate (% min) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading					California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0	

	Voids filled with asphalt (%) ⁱ No. 4 grading 3/8" grading 1/2" grading 3/4" grading		California Test 367	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only
	Dust proportion ⁱ No. 4 and 3/8" gradings 1/2" and 3/4" gradings		California Test 367	0.6–1.2 0.6–1.2	0.6–1.2 0.6–1.2	Report only
	Hamburg Wheel Tracker (minimum number of passes at 0.5 inch average rut depth) ⁱ PG-58 PG-64 PG-70 PG-76 or higher		AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--
	Hamburg Wheel Tracker (inflection point minimum number of passes) ⁱ PG-58 PG-64 PG-70 PG-76 or higher		AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--
	Moisture susceptibility (minimum dry strength, psi) ⁱ		California Test 371	120	120	--
	Moisture susceptibility (tensile strength ratio %) ⁱ		California Test 371	70	70	70
	Smoothness		Section 39-1.12	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀
	Asphalt binder		Various	Section 92	Section 92	Section 92
	Asphalt rubber binder		Various	--	--	Section 92-1.01D(2) and section 39-1.02D
	Asphalt modifier		Various	--	--	Section 39-1.02D
	CRM		Various	--	--	Section 39-1.02D

- ^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.
- ^b "X" denotes the sieves the Engineer tests for the specified aggregate gradation.
- ^c The tolerances must comply with the allowable tolerances in section 39-1.02E.
- ^d The Engineer determines field compaction for any of the following conditions:
 1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and less than 0.20 foot.
 2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.
- ^e To determine field compaction, the Engineer uses:
 1. California Test 308, Method A, to determine in-place density of each density core.
 2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.
- ^f The Engineer reports the average of 3 tests from a single split sample.
- ^g The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
- ^h The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.
- ⁱ Report only.
- ^j Applies to RAP substitution rate greater than 15 percent.

Replace the 3rd paragraph of section 39-4.04A with:

01-20-12

The Department determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 and any layer is less than 0.20 foot.

AA

40 CONCRETE PAVEMENT

01-20-12

Replace section 40-1.01C(4) with:

01-20-12

40-1.01C(4) Authorized Laboratory

Submit for authorization the name of the laboratory you propose to use for testing the drilled core specimens for air content.

Replace the paragraph in section 40-1.01C(8) with:

01-20-12

Submit a plan for protecting concrete pavement during the initial 72 hours after paving when the forecasted minimum ambient temperature is below 40 degrees F.

01-20-12

Delete "determined under California Test 559" in section 40-1.01C(9).

Replace the 2nd and 3rd paragraphs in section 40-1.01D(4) with:

01-20-12

The QC plan must include details of corrective action to be taken if any process is out of control. As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
 - 2.1. One point falls outside the suspension limit line
 - 2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent material.

Replace the 1st paragraph in section 40-1.01D(5) with:

01-20-12

Determine the minimum cementitious materials content. Use your value for minimum cementitious material content for *MC* in equation 1 and equation 2 of section 90-1.02B(3).

Replace the 1st sentence of the 3rd paragraph of section 40-1.01D(9) with:

01-20-12

Use a California profilograph to determine the concrete pavement profile.

Replace the title of the table in section 40-1.01D(13)(a) with:

01-20-12

Concrete Pavement Acceptance Testing

Replace the 2nd and 3rd paragraphs in section 40-1.01D(13)(a) with:

01-20-12

Pavement smoothness may be accepted based on the Department's testing. A single test represents no more than 0.1 mile.

Acceptance of modulus of rupture, thickness, dowel bar and tie bar placement, coefficient of friction, smoothness, and air content, does not constitute final concrete pavement acceptance.

01-20-12

Delete item 4 in the list in the 2nd paragraph in section 40-1.01D(13)(c)(2).

Replace items 1 and 2 in the list in the 2nd paragraph in 40-1.01D(13)(d) with:

01-20-12

1. For tangents and horizontal curves having a centerline radius of curvature 2,000 feet or more, the PI_0 must be at most 2-1/2 inches per 0.1-mile section.
2. For horizontal curves having a centerline radius of curvature from 1,000 to 2,000 feet including concrete pavement within the superelevation transitions of those curves, the PI_0 must be at most 5 inches per 0.1-mile section.

Replace the 1st and 2nd variables in the equation in section 40-1.01D(13)(f) with:

01-20-12

n_c = Number of your quality control tests (minimum of 6 required)

n_v = Number of verification tests (minimum of 2 required)

Replace "Your approved third party independent testing laboratory" in the 4th paragraph of section 40-1.01D(13)(f) with:

01-20-12

The authorized laboratory

Replace item 2 in the list in the 2nd paragraph of section 40-1.01D(13)(g):

01-20-12

2. One test for every 4,000 square yards of concrete pavement with tie bars or remaining fraction of that area. Each tie bar test consists of 2 cores with 1 on each tie-bar-end to expose both ends and allow measurement.

Replace section 40-1.01D(13)(h) with:

01-20-12

40-1.01D(13)(h) Bar Reinforcement

Bar reinforcement is accepted based on inspection before concrete placement.

Replace the paragraph in section 40-1.02B(2) with:

01-20-12

PCC for concrete pavement must comply with section 90-1 except as otherwise specified.

Replace the paragraphs in section 40-1.02D with:

01-20-12

Bar reinforcement must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, bar reinforcement must comply with section 52.

If the project is shown to be in high desert or any mountain climate regions, bar reinforcement must be one of the following:

1. Epoxy-coated bar reinforcement under section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Low carbon, chromium steel bar complying with ASTM A 1035/A 1035M

Replace the paragraphs in section 40-1.02E with:

01-20-12

Tie bars must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with either section 52-2.02B or 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02C, or section 52-2.03C.

Do not bend tie bars.

Replace the 1st, 2nd, and 3rd paragraphs in section 40-1.02F with:

01-20-12

Dowel bars must be plain bars. Fabricate, sample, and handle epoxy-coated dowel bars under ASTM D 3963/D 3963M and section 52-2.03C except each sample must be 18 inches long.

If the project is not shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with either section 52-2.02B or 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with section 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Replace the paragraphs in section 40-1.02G with:

01-20-12

For dowel and tie bar baskets, wire must comply with ASTM A 82/A 82M and be welded under ASTM A 185/A 185M, Section 7.4. The minimum wire-size no. is W10. Use either U-frame or A-frame shaped assemblies.

If the project is not shown to be in high desert or any mountain climate region. Baskets may be epoxy-coated, and the epoxy coating must comply with either section 52-2.02B or 52-2.03B.

If the project is shown to be in high desert or any mountain climate region, wire for dowel bar and tie bar baskets must be one of the following:

1. Epoxy-coated wire complying with section 52-2.03B
2. Stainless-steel wire. Wire must be descaled, pickled, and polished solid stainless-steel. Wire must comply with (1) the chemical requirements in ASTM A 276/A 276M, UNS Designation S31603 or S31803 and (2) the tension requirements in ASTM A 1022/ A 1022M.

Handle epoxy-coated tie bar and dowel bar baskets under ASTM D 3963/D 3963M and either section 52-2.02B or 52-2.03B.

Fasteners must be driven fasteners under ASTM F 1667. Fasteners on lean concrete base or HMA must have a minimum shank diameter of 3/16 inch and a minimum shank length of 2-1/2 inches. For asphalt

treated permeable base or cement treated permeable base, the shank diameter must be at least 3/16 inch and the shank length must be at least 5 inches.

Fasteners, clips, and washers must have a minimum 0.2-mil thick zinc coating applied by either electroplating or galvanizing.

Replace the 1st paragraph in section 40-1.02H with:

01-20-12

Chemical adhesive for drilling and bonding dowels and tie bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for the concrete temperature and installation conditions.

Replace section 40-1.02I(2) with:

01-20-12

40-1.02I(2) Silicone Joint Sealant

Silicone joint sealant must be on the Authorized Material List.

Replace the last sentence in section 40-1.02I(4) with:

01-20-12

Show evidence that the seals are compressed from 30 to 50 percent for the joint width at time of installation.

Replace the paragraph in section 40-1.02L with:

01-20-12

Water for core drilling may be obtained from a potable water source, or submit proof that it does not contain:

1. More than 1,000 parts per million of chlorides as Cl
2. More than 1,300 parts per million of sulfates as SO_4
3. Impurities that cause pavement discoloration or surface etching

Replace the paragraph in section 40-1.03B with:

01-20-12

Before placing concrete pavement, develop enough water supply for the work under section 17.

Replace the last paragraph in section 40-1.03D(1) with:

01-20-12

Removal of grinding residue must comply with section 42-1.03B.

Replace the 1st and 2nd paragraphs in section 40-1.03E(6)(c) with:

01-20-12

Install preformed compressions seals in isolation joints if specified in the special provisions.

Install longitudinal seals before transverse seals. Longitudinal seals must be continuous except splicing is allowed at intersections with transverse seals. Transverse seals must be continuous for the entire transverse length of concrete pavement except splices are allowed for widenings and staged construction. With a sharp instrument, cut across the longitudinal seal at the intersection with transverse

construction joints. If the longitudinal seal does not relax enough to properly install the transverse seal, trim the longitudinal seal to form a tight seal between the 2 joints.

If splicing is authorized, splicing must comply with the manufacturer's written instructions.

Replace the 12th and 13th paragraphs in section 40-1.03G with:

01-20-12

Construct additional test strips if you:

1. Propose different paving equipment including:
 - 1.1. Paver
 - 1.2. Dowel bar inserter
 - 1.3. Tie bar inserter
 - 1.4. Tining
 - 1.5. Curing equipment
2. Change concrete mix proportions

You may request authorization to eliminate the test strip if you use paving equipment and personnel from a Department project (1) for the same type of pavement and (2) completed within the past 12 months. Submit supporting documents and previous project information with your request.

Replace the 1st paragraph in section 40-1.03I with:

01-20-12

Place tie bars in compliance with the tolerances shown in the following table:

Tie Bar Tolerance	
Dimension	Tolerance
Horizontal and vertical skew	10 degrees maximum
Longitudinal translation	± 2 inch maximum
Horizontal offset (embedment)	± 2 inch maximum
Vertical depth	1. Not less than 1/2 inch below the saw cut depth of joints 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom

Replace item 4 in the list in the 2nd paragraph in section 40-1.03I with:

01-20-12

4. Use tie bar baskets. Anchor baskets at least 200 feet in advance of pavement placement activity. If you request a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before paving, demonstrate the tie bars do not move from their specified depth and alignment during paving. Use fasteners to anchor tie bar baskets.

Replace "The maximum distance below the depth shown must be 0.05 foot." in the table in section 40-1.03J with:

01-20-12

The maximum distance below the depth shown must be 5/8 inch.

40-1.03L Finishing

40-1.03L(1) General

Reserved

40-1.03L(2) Preliminary Finishing

40-1.03L(2)(a) General

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day's paving with a stamp. The stamp must be authorized before paving starts. The stamp must be approximately 1 by 2 feet in size. The stamp must form a uniform mark from 1/8 to 1/4 inch deep. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the pavement's outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement's outside edge.

Do not apply more water to the pavement surface than can evaporate before float finishing and texturing are completed.

40-1.03L(2)(b) Stationary Side Form Finishing

If stationary side form construction is used, give the pavement a preliminary finish by the machine float method or the hand method.

If using the machine float method:

1. Use self-propelled machine floats.
2. Determine the number of machine floats required to perform the work at a rate equal to the pavement delivery rate. If the time from paving to machine float finishing exceeds 30 minutes, stop pavement delivery. When machine floats are in proper position, you may resume pavement delivery and paving.
3. Run machine floats on side forms or adjacent pavement lanes. If running on adjacent pavement, protect the adjacent pavement surface under section 40-1.03P. Floats must be hardwood, steel, or steel-shod wood. Floats must be equipped with devices that adjust the underside to a true flat surface.

If using the hand method, finish pavement smooth and true to grade with manually operated floats or powered finishing machines.

40-1.03L(2)(c) Slip-Form Finishing

If slip-form construction is used, the slip-form paver must give the pavement a preliminary finish. You may supplement the slip-form paver with machine floats.

Before the pavement hardens, correct pavement edge slump in excess of 0.02 foot exclusive of edge rounding.

40-1.03L(3) Final Finishing

After completing preliminary finishing, round the edges of the initial paving widths to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Construct longitudinal grooves with a self-propelled machine designed specifically for grooving and texturing pavement. The machine must have tracks to maintain constant speed, provide traction, and maintain accurate tracking along the pavement surface. The machine must have a single row of rectangular spring steel tines. The tines must be from 3/32 to 1/8 inch wide, on 3/4-inch centers, and must have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep. The machine must have horizontal and vertical controls. The machine must apply constant down pressure on the pavement surface during texturing. The machines must not cause ravels.

Construct grooves over the entire pavement width in a single pass except do not construct grooves 3 inches from the pavement edges and longitudinal joints. Final texture must be uniform and smooth. Use a guide to properly align the grooves. Grooves must be parallel and aligned to the pavement edge across the pavement width. Grooves must be from 1/8 to 3/16 inch deep after the pavement has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand-construct grooves under section 40-1.03L(2) using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Initial and final texturing must produce a coefficient of friction of at least 0.30 when tested under California Test 342. Notify the Engineer when the pavement is scheduled to be opened to traffic to allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is ready for testing which is the latter of:

1. Seven days after paving
2. When the pavement has attained a modulus of rupture of 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

40-1.03M Reserved

Replace the 4th paragraph of 40-1.03P with:

01-20-12

Construct crossings for traffic convenience. If authorized, you may use RSC for crossings. Do not open crossings until the Department determines that the pavement's modulus of rupture is at least 550 psi under California Test 523 or California Test 524.

Replace the 1st paragraph of section 40-6.01A with:

01-20-12

Section 40-6 includes specifications for applying a high molecular weight methacrylate resin system to pavement surface cracks that do not extend the full slab depth.

Replace the 4th paragraph of section 40-6.01C(2) with:

01-20-12

If the project is in an urban area adjacent to a school or residence, the public safety plan must also include an airborne emissions monitoring plan prepared by a CIH certified in comprehensive practice by the American Board of Industrial Hygiene. Submit a copy of the CIH's certification. The CIH must monitor the emissions at a minimum of 4 points including the mixing point, the application point, and the point of nearest public contact. At work completion, submit a report by the industrial hygienist with results of the airborne emissions monitoring plan.

Delete the 1st sentence of the 2nd paragraph in section 40-6.02B.

01-20-12

Replace item 4 in the list in the last paragraph in section 40-6.03A with:

01-20-12

4. Coefficient of friction is at least 0.30 under California Test 342

01-20-12

01-20-12

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10-19-12

10-19-12

10-19-12

[illegible]

04-19-13

01-18-13

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01-18-13

Delete the 5th and 6th paragraphs of section 46-1.01C(2).

Replace the 4th paragraph of section 46-1.01D(2)(b) with:

01-18-13

Each jack and its gage must be calibrated as a unit under the specifications for jacks used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength in section 50-1.01D(3).

10-19-12

Delete the 3rd paragraph of section 46-1.01D(2)(d).

Add to section 46-1.03B:

04-20-12

Dispose of drill cuttings under section 19-2.03B.

Replace the 1st sentence of the 3rd paragraph of section 46-2.01A with:

04-20-12

Ground anchors must comply with section 50.

Add to section 46-2.02B:

04-20-12

Strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50.

^^

47 EARTH RETAINING SYSTEMS

04-19-13

Replace the 2nd paragraph of section 47-2.01D with:

02-17-12

Coupler test samples must comply with minimum tensile specifications for steel wire in ASTM A 82/A 82M. Total wire slip must be at most 3/16 inch when tested under the specifications for tension testing of round wire test samples in ASTM A 370.

Replace "78-80" in the 1st table in the 2nd paragraph of section 47-2.02C with:

10-19-12

78-100

Replace the value for the sand equivalent requirement in the 2nd table in the 3rd paragraph of section 47-2.02C with:

01-20-12

12 minimum

Replace the 1st paragraph of section 47-2.02E with:

02-17-12

Steel wire must comply with ASTM A 82/A 82M. Welded wire reinforcement must comply with ASTM A 185/A 185M.

Add between the 2nd and 3rd paragraphs of section 47-3.02A:

10-19-12

Reinforcement must comply with section 52.

10-19-12

Delete the 1st paragraph of section 47-3.02B(2)(b).

Add between the 3rd and 4th paragraphs of section 47-5.01:

10-19-12

Reinforcement must comply with section 52.

Add to section 47-6.01A:

10-19-12

The alternative earth retaining system must comply with the specifications for the type of wall being constructed.

Replace "sets" at each occurrence in the 1st paragraph of section 47-6.01C with:

04-19-13

copies

^^

48 TEMPORARY STRUCTURES

04-19-13

Replace "previously welded splice" and its definition in section 48-2.01B with:

04-19-13

previously welded splice: Splice made in a falsework member in compliance with AWS D1.1 or other recognized welding standard before contract award.

04-19-13

Delete "field" in the 1st sentence of the 5th paragraph of section 48-2.01C(1).

Replace item 1 in the list in the 6th paragraph of section 48-2.01C(1) with:

04-19-13

1. Itemize the testing, inspection methods, and acceptance criteria used

Replace the 7th paragraph of section 48-2.01C(2) with:

09-16-11

If you submit multiple submittals at the same time or additional submittals before review of a previous submittal is complete:

1. You must designate a review sequence for submittals
2. Review time for any submittal is the review time specified plus 15 days for each submittal of higher priority still under review

Replace the 1st paragraph of section 48-2.01D(2) with:

04-19-13

Welding must comply with AWS D1.1 or other recognized welding standard, except for fillet welds where the load demands are 1,000 lb or less per inch for each 1/8 inch of fillet weld.

Replace the 1st through 3rd sentences in the 2nd paragraph of section 48-2.01D(2) with:

04-19-13

Perform NDT on welded splices using UT or RT. Each weld and any repair made to a previously welded splice must be tested.

Replace the 3rd paragraph of section 48-2.01D(2) with:

04-19-13

For previously welded splices, perform and document all necessary testing and inspection required to certify the ability of the falsework members to sustain the design stresses.

AA

49 PILING

04-19-13

Replace "sets" in the 1st paragraph of section 49-1.01C(2) with:

04-19-13

copies

Replace "set" in the 2nd paragraph of section 49-1.01C(2) with:

04-19-13

copy

Replace "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" in the 5th paragraph of section 49-1.01D(2) with:

07-20-12

"Tensile Load Applied by Hydraulic Jack(s) Acting Upward at One End of Test Beam(s)"

Add to section 49-1.03:

04-20-12

Dispose of drill cuttings under section 19-2.03B.

Replace the 2nd paragraph of section 49-2.01D with:

01-20-12

Furnish piling is measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff.

Replace "sets" in the 1st paragraph of section 49-2.04A(3) with:

04-19-13

copies

Replace the 3rd and 4th paragraphs of section 49-2.04B(2) with:

10-19-12

Piles in a corrosive environment must be steam or water cured under section 90-4.03.

If piles in a corrosive environment are steam cured, either:

1. Keep the piles continuously wet for at least 3 days. The 3 days includes the holding and steam curing periods.
2. Apply curing compound under section 90-1.03B(3) after steam curing.

Add to section 49-3.01A:

01-20-12

Concrete must comply with section 51.

Replace the 1st paragraph of section 49-3.01C with:

01-20-12

Except for CIDH concrete piles constructed under slurry, construct CIP concrete piles such that the excavation methods and the concrete placement procedures provide for placing the concrete against undisturbed material in a dry or dewatered hole.

Replace "Reserved" in section 49-3.02A(2) with:

01-20-12

dry hole:

1. Except for CIDH concrete piles specified as end bearing, a drilled hole that:
 - 1.1. Accumulates no more than 12 inches of water in the bottom of the drilled hole during a period of 1 hour without any pumping from the hole during the hour.
 - 1.2. Has no more than 3 inches of water in the bottom of the drilled hole immediately before placing concrete.
2. For CIDH concrete piles specified as end bearing, a drilled hole free of water without the use of pumps.

Replace "Reserved" in section 49-3.02A(3)(a) with:

01-20-12

If plastic spacers are proposed for use, submit the manufacturer's data and a sample of the plastic spacer. Allow 10 days for review.

Replace item 5 in the list in the 1st paragraph of section 49-3.02A(3)(b) with:

10-19-12

5. Methods and equipment for determining:
 - 5.1. Depth of concrete
 - 5.2. Theoretical volume of concrete to be placed, including the effects on volume if casings are withdrawn
 - 5.3. Actual volume of concrete placed

Add to the list in the 1st paragraph of section 49-3.02A(3)(b):

01-18-13

8. Drilling sequence and concrete placement plan.

Replace item 2 in the list in the 1st paragraph of section 49-3.02A(3)(g) with:

01-20-12

2. Be sealed and signed by an engineer who is registered as a civil engineer in the State. This requirement is waived for either of the following conditions:
 - 2.1. The proposed mitigation will be performed under the current Department-published version of *ADSC Standard Mitigation Plan 'A' - Basic Repair* without exception or modification.
 - 2.2. The Engineer determines that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and you elect to repair the pile using the current Department-published version of *ADSC Standard Mitigation Plan 'B' - Grouting Repair* without exception or modification.

Replace item 1 in the list in the 1st paragraph of section 49-3.02A(4)(d)(ii) with:

01-20-12

1. Inspection pipes must be schedule 40 PVC pipe complying with ASTM D 1785 with a nominal pipe size of 2 inches. Watertight PVC couplers complying with ASTM D 2466 are allowed to facilitate pipe lengths in excess of those commercially available. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.

Add to section 49-3.02A(4)(d)(iv):

01-20-12

If the Engineer determines it is not feasible to use one of ADSC's standard mitigation plans to mitigate the pile, schedule a meeting and meet with the Engineer before submitting a nonstandard mitigation plan.

The meeting attendees must include your representatives and the Engineer's representatives involved in the pile mitigation. The purpose of the meeting is to discuss the type of pile mitigation acceptable to the Department.

Provide the meeting facility. The Engineer conducts the meeting.

Replace the 1st paragraph of section 49-3.02B(5) with:

01-20-12

Grout used to backfill casings must comply with section 50-1.02C, except:

1. Grout must consist of cementitious material and water, and may contain an admixture if authorized. Cementitious material must comply with section 90-1.02B, except SCMs are not required. The minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.
2. Aggregate must be used to extend the grout as follows:

- 2.1. Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
 - 2.2. Fine aggregate must comply with section 90-1.02C(3).
 - 2.3. Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 90 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
3. California Test 541 is not required.
4. Grout is not required to pass through a sieve with a 0.07-inch maximum clear opening before being introduced into the grout pump.

Replace section 49-3.02B(8) with:

01-20-12

49-3.02B(8) Spacers

Spacers must comply with section 52-1.03D, except you may use plastic spacers.

Plastic spacers must:

1. Comply with sections 3.4 and 3.5 of the Concrete Reinforcing Steel Institute's *Manual of Standard Practice*
2. Have at least 25 percent of their gross plane area perforated to compensate for the difference in the coefficient of thermal expansion between the plastic and concrete
3. Be of commercial quality

Add to section 49-3.02C(4):

01-20-12

Unless otherwise shown, the bar reinforcing steel cage must have at least 3 inches of clear cover measured from the outside of the cage to the sides of the hole or casing.

Place spacers at least 5 inches clear from any inspection tubes.

Place plastic spacers around the circumference of the cage and at intervals along the length of the cage, as recommended by the manufacturer.

AA

50 PRESTRESSING CONCRETE

04-19-13

Replace "sets" at each occurrence in the 2nd and 3rd paragraphs of section 50-1.01C(3) with:

04-19-13

copies

Replace the 3rd paragraph of section 50-1.01D(2) with:

10-19-12

The Department may verify the prestressing force using the Department's load cells.

Replace the 6th paragraph of section 50-1.01D(3) with:

01-18-13

Jacking equipment must be calibrated as follows:

1. Each jack and its gage must be calibrated as a unit.

2. Each jack used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength must be calibrated by METS within 1 year of use and after each repair. You must:
 - 2.1. Schedule the calibration of the jacking equipment with METS
 - 2.2. Verify that the jack and supporting systems are complete, with proper components, and are in good operating condition
 - 2.3. Mechanically calibrate the gages with a dead weight tester or other authorized means before calibration of the jacking equipment by METS
 - 2.4. Provide enough labor, equipment, and material to (1) install and support the jacking and calibration equipment and (2) remove the equipment after the calibration is complete
 - 2.5. Plot the calibration results
3. Each jack used to tension prestressing steel permanently anchored at less than 25 percent of its specified minimum ultimate tensile strength must be calibrated by an authorized laboratory within 6 months of use and after each repair.

Replace "diameter" in item 9 in the list in the 1st paragraph of section 50-1.02D with:

04-20-12

cross-sectional area

Add to section 50-1.02:

09-16-11

50-1.02G Sheathing

Sheathing for debonding prestressing strand must:

1. Be split or un-split flexible polymer plastic tubing
2. Have a minimum wall thickness of 0.025 inch
3. Have an inside diameter exceeding the maximum outside diameter of the strand by 0.025 to 0.14 inch

Split sheathing must overlap at least 3/8 inch.

Waterproofing tape used to seal the ends of the sheathing must be flexible adhesive tape.

The sheathing and waterproof tape must not react with the concrete, coating, or steel.

Add to section 50-1.03B(1):

01-20-12

After seating, the maximum tensile stress in the prestressing steel must not exceed 75 percent of the minimum ultimate tensile strength shown.

Add to section 50-1.03B(2):

09-16-11

50-1.03B(2)(e) Debonding Prestressing Strands

Where shown, debond prestressing strands by encasing the strands in plastic sheathing along the entire length shown and sealing the ends of the sheathing with waterproof tape.

Distribute the debonded strands symmetrically about the vertical centerline of the girder. The debonded lengths of pairs of strands must be equal.

Do not terminate debonding at any one cross section of the member for more than 40 percent of the debonded strands or 4 strands, whichever is greater.

Thoroughly seal the ends with waterproof tape to prevent the intrusion of water or cement paste before placing the concrete.

AA

51 CONCRETE STRUCTURES

04-19-13

Replace the paragraphs of section 51-1.01A with:

10-19-12

Section 51-1 includes general specifications for constructing concrete structures.

Earthwork for the following concrete structures must comply with section 19-3:

1. Sound wall footings
2. Sound wall pile caps
3. Culverts
4. Barrier slabs
5. Junction structures
6. Minor structures
7. Pipe culvert headwalls, endwalls, and wingwalls for a pipe with a diameter of 5 feet or greater

Falsework must comply with section 48-2.

Joints must comply with section 51-2.

Elastomeric bearing pads must comply with section 51-3.

Reinforcement for the following concrete structures must comply with section 52:

1. Sound wall footings
2. Sound wall pile caps
3. Barrier slabs
4. Junction structures
5. Minor structures
6. PC concrete members

You may use RSC for a concrete structure only where the specifications allow the use of RSC.

Replace the heading of section 51-1.01D(4) with:

04-19-13

Testing Concrete Surfaces

Add to section 51-1.01D(4)(a):

04-19-13

The Engineer tests POC deck surfaces for smoothness and crack intensity.

Add to the list in the 1st paragraph of section 51-1.01D(4)(b):

04-19-13

3. Completed deck surfaces, including ramps and landings of POCs

Replace the 4th paragraph in section 51-1.01D(4)(b) with:

04-19-13

Except for POCs, surface smoothness is tested using a bridge profilograph under California Test 547. Two profiles are obtained in each lane approximately 3 feet from the lane lines and 1 profile is obtained in

each shoulder approximately 3 feet from the curb or rail face. Profiles are taken parallel to the direction of traffic.

Add between the 5th and 6th paragraphs of section 51-1.01D(4)(b):

04-19-13

POC deck surfaces must comply with the following smoothness requirements:

1. Surfaces between grade changes must not vary more than 0.02 foot from the lower edge of a 12-foot-long straightedge placed parallel to the centerline of the POC
2. Surface must not vary more than 0.01 foot from the lower edge of a 6-foot-long straightedge placed perpendicular to the centerline of the POC

Add to section 51-1.01D(4)(d):

04-19-13

The Engineer measures crack intensity of POC deck surfaces after curing, before prestressing, and before falsework release. Clean the surface for the Engineer to measure surface crack intensity.

In any 100 sq ft portion of a new POC deck surface, if there are more than 10 feet of cracks having a width at any point of over 0.02 inch, treat the deck with methacrylate resin under section 15-5.05. Treat the entire deck width between the curbs to 5 feet beyond where the furthest continuous crack emanating from the 100 sq ft section is 0.02 inch wide. Treat the deck surface before grinding.

Add to section 51-1.03C(2)(c)(i):

04-20-12

Permanent steel deck forms are only allowed where shown or if specified as an option in the special provisions.

Replace the 3rd paragraph of section 51-1.03C(2)(c)(ii) with:

04-20-12

Compute the physical design properties under AISI's *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Replace the 8th paragraph of section 51-1.03D(1) with:

10-19-12

Except for concrete placed as pipe culvert headwalls and endwalls, slope paving and aprons, and concrete placed under water, consolidate concrete using high-frequency internal vibrators within 15 minutes of placing concrete in the forms. Do not attach vibrators to or hold them against forms or reinforcing steel. Do not displace reinforcement, ducts, or prestressing steel during vibrating.

Add to section 51-1.03E(5):

08-05-11

Drill the holes without damaging the adjacent concrete. If reinforcement is encountered during drilling before the specified depth is attained, notify the Engineer. Unless coring through the reinforcement is authorized, drill a new hole adjacent to the rejected hole to the depth shown.

Add to section 51-1.03F(5)(a):

04-19-13

For approach slabs, sleeper slabs, and other roadway surfaces of concrete structures, texture the roadway surface as specified for bridge deck surfaces in section 51-1.03F(5)(b).

Replace "Reserved" in section 51-1.03F(5)(b) with:

04-20-12

51-1.03F(5)(b)(i) General

Except for bridge widenings, texture the bridge deck surfaces longitudinally by grinding and grooving or by longitudinal tining.

10-19-12

For bridge widenings, texture the deck surface longitudinally by longitudinal tining.

04-20-12

In freeze-thaw areas, do not texture PCC surfaces of bridge decks.

51-1.03F(5)(b)(ii) Grinding and Grooving

When texturing the deck surface by grinding and grooving, place a 1/4 inch of sacrificial concrete cover on the bridge deck above the finished grade shown. Place items to be embedded in the concrete based on the final profile grade elevations shown. Construct joint seals after completing the grinding and grooving.

Before grinding and grooving, deck surfaces must comply with the smoothness and deck crack treatment requirements.

Grind and groove the deck surface as follows:

1. Grind the surface to within 18 inches of the toe of the barrier under section 42-3. Grinding must not reduce the concrete cover on reinforcing steel to less than 1-3/4 inches.
2. Groove the ground surfaces longitudinally under section 42-2. The grooves must be parallel to the centerline.

51-1.03F(5)(b)(iii) Longitudinal Tining

When texturing the deck surface by longitudinal tining, perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with spring steel tines that produce grooves parallel with the centerline.

The tines must:

1. Be rectangular in cross section
2. Be from 3/32 to 1/8 inch wide on 3/4-inch centers
3. Have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep

Construct grooves to within 6 inches of the layout line of the concrete barrier toe. Grooves must be from 1/8 to 3/16 inch deep and 3/16 inch wide after concrete has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand construct grooves. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Tining must not cause tearing of the deck surface or visible separation of coarse aggregate at the surface.

Add to section 51-1.03F:

04-19-13

51-1.03F(6) Finishing Pedestrian Overcrossing Surfaces

Construct deck surfaces, including ramps and landings of POCs to the grade and cross section shown. Surfaces must comply with the specified smoothness, surface texture, and surface crack requirements.

The Engineer sets deck elevation control points for your use in establishing the grade and cross section of the deck surface. The grade established by the deck elevation control points includes all camber allowances. Except for landings, elevation control points include the beginning and end of the ramp and will not be closer together than approximately 8 feet longitudinally and 4 feet transversely to the POC centerline. Landing elevation control points are at the beginning and the end of the landing.

Broom finish the deck surfaces of POCs. Apply the broom finish perpendicular to the path of travel. You may apply water mist to the surface immediately before brooming.

Clean any discolored concrete by abrasive blast cleaning or other authorized methods.

Replace the paragraphs of section 51-1.04 with:

10-19-12

If concrete involved in bridge work is not designated by type and is not otherwise paid for under a separate bid item, the concrete is paid for as structural concrete, bridge.

The payment quantity for structural concrete includes the volume in the concrete occupied by bar reinforcing steel, structural steel, prestressing steel materials, and piling.

The payment quantity for seal course concrete is the actual volume of seal course concrete placed except the payment quantity must not exceed the volume of concrete contained between vertical planes 1 foot outside the neat lines of the seal course shown. The Department does not adjust the unit price for an increase or decrease in the seal course concrete quantity.

Structural concrete for pier columns is measured as follows:

1. Horizontal limits are vertical planes at the neat lines of the pier column shown.
2. Bottom limit is the bottom of the foundation excavation in the completed work.
3. Upper limit is the top of the pier column concrete shown.

The payment quantity for drill and bond dowel is determined from the number and depths of the holes shown.

Replace section 51-2.01B(2) with:

04-19-13

51-2.01B(2) Reserved

04-19-13

Delete the 4th paragraph of section 51-2.01C.

Replace "SSPC-QP 3" in the 1st paragraph of section 51-2.02A(2) with:

10-19-12

AISC-420-10/SSPC-QP 3

Replace the 2nd and 3rd paragraphs of section 51-2.02B(3)(b) with:

04-20-12

Concrete saws for cutting grooves in the concrete must have diamond blades with a minimum thickness of 3/16 inch. Cut both sides of the groove simultaneously for a minimum 1st pass depth of 2 inches. The completed groove must have:

1. Top width within 1/8 inch of the width shown or ordered
2. Bottom width not varying from the top width by more than 1/16 inch for each 2 inches of depth
3. Uniform width and depth

Cutting grooves in existing decks includes cutting any conflicting reinforcing steel.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02D(1)(c)(ii) with:

copies

04-19-13

Replace "set" in the 7th paragraph of section 51-2.02D(1)(c)(ii) with:

copy

04-19-13

Add to the 1st paragraph of section 51-2.02D(3):

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

04-19-13

Replace "sets" in the 2nd paragraph of section 51-2.02E(1)(c) with:

copies

04-19-13

Replace "set" in the 6th paragraph of section 51-2.02E(1)(c) with:

copy

04-19-13

Replace the 2nd paragraph of section 51-2.02E(1)(e) with:

Except for components in contact with the tires, the design loading must be the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. Each component in contact with the tires must support a minimum of 80 percent of the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. The tire contact area must be 10 inches measured normal to the longitudinal assembly axis by 20 inches wide. The assembly must provide a smooth-riding joint without slapping of components or tire rumble.

08-05-11

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02F(1)(c) with:

copies

04-19-13

Add between the 1st and 2nd paragraphs of section 51-4.01A:

Prestressing concrete members must comply with section 50.

10-19-12

Delete the 2nd paragraph of section 51-4.01A.

04-20-12

Replace the 3rd paragraph of section 51-4.01C(2) with:

04-20-12

For segmental or spliced-girder construction, shop drawings must include the following additional information:

1. Details showing construction joints or closure joints
2. Arrangement of bar reinforcing steel, prestressing tendons, and pressure-grouting pipe
3. Materials and methods for making closures
4. Construction joint keys and surface treatment
5. Other requested information

For segmental girder construction, shop drawings must include concrete form and casting details.

Replace "sets" in the 1st paragraph of section 51-4.01C(3) with:

04-19-13

copies

Delete the 1st and 2nd paragraphs of section 51-4.02A.

10-19-12

Replace the 3rd paragraph of section 51-4.02B(2) with:

04-20-12

For segmental or spliced-girder construction, materials for construction joints or closure joints at exterior girders must match the color and texture of the adjoining concrete.

Add to section 51-4.02B(2):

04-20-12

At spliced-girder closure joints:

1. If shear keys are not shown, the vertical surfaces of the girder segment ends must be given a coarse texture as specified for the top surface of PC members.
2. Post-tensioning ducts must extend out of the vertical surface of the girder segment closure end sufficiently to facilitate splicing of the duct.

For spliced girders, pretension strand extending from the closure end of the girder segment to be embedded in the closure joint must be free of mortar, oil, dirt, excessive mill scale and scabby rust, and other coatings that would destroy or reduce the bond.

Add to section 51-4.03B:

04-20-12

The specifications for prestressing force distribution and sequencing of stressing in the post-tensioning activity in 50-1.03B(2)(a) do not apply if post-tensioning of spliced girders before starting deck construction is described. The composite deck-girder structure must be post-tensioned in a subsequent stage.

Temporary spliced-girder supports must comply with the specifications for falsework in section 48-2.

Before post-tensioning of spliced girders, remove the forms at CIP concrete closures and intermediate diaphragms to allow inspection for concrete consolidation.

Add between the 1st and 2nd paragraphs of section 51-7.01A:

10-19-12

Minor structures include:

1. Pipe culvert headwalls and endwalls for a pipe with a diameter less than 5 feet
2. Drainage inlets
3. Other structures described as minor structures

Delete the 4th paragraph of section 51-7.01A.

10-19-12

Replace the 1st and 2nd paragraphs of section 51-7.01B with:

10-19-12

Concrete must comply with the specifications for minor concrete.

Add to section 51:

10-19-12

51-8–51-15 RESERVED

AA

52 REINFORCEMENT

01-18-13

Add to section 52-1.01A:

07-20-12

Splicing of bar reinforcement must comply with section 52-6.

Replace the 1st and 2nd paragraphs of section 52-1.02B with:

10-19-12

Reinforcing bars must be deformed bars complying with ASTM A 706/A 706M, Grade 60, except you may use:

1. Deformed bars complying with ASTM A 615/A 615M, Grade 60, in:
 - 1.1. Junction structures
 - 1.2. Sign and signal foundations
 - 1.3. Minor structures
 - 1.4. Concrete crib members
 - 1.5. Mechanically-stabilized-embankment concrete panels
 - 1.6. Masonry block sound walls
2. Deformed or plain bars complying with ASTM A 615/A 615M, Grade 40 or 60, in:
 - 2.1. Slope and channel paving
 - 2.2. Concrete barriers Type 50 and 60
3. Plain bars for spiral or hoop reinforcement in structures and concrete piles

Add to the list in the 3rd paragraph of section 52-1.02B:

04-20-12

9. Shear reinforcement stirrups in PC girders

Replace the 6th paragraph of section 52-6.01D(4)(a) with:

01-18-13

Before performing service splice or ultimate butt splice testing, perform total slip testing on the service splice or ultimate butt splice test samples under section 52-6.01D(4)(b).

Replace section 52-6.02D with:

10-21-11

52-6.02D Ultimate Butt Splice Requirements

When tested under California Test 670, ultimate butt splice test samples must demonstrate necking as either of the following:

1. For "Necking (Option I)," the test sample must rupture in the reinforcing bar outside of the affected zone and show visible necking.
2. For "Necking (Option II)," the largest measured strain must be at least:
 - 2.1. Six percent for no. 11 and larger bars
 - 2.2. Nine percent for no. 10 and smaller bars

Replace the 2nd and 3rd paragraphs of section 52-6.03B with:

01-18-13

Do not splice the following by lapping:

1. No. 14 bars
2. No. 18 bars
3. Hoops
4. Reinforcing bars where you cannot provide a minimum clear distance of 2 inches between the splice and the nearest adjacent bar

AA

54 WATERPROOFING

04-20-12

Add between "be" and "3/8 inch" in the 3rd paragraph of section 54-4.02C:

04-20-12

at least

AA

55 STEEL STRUCTURES

04-19-13

Replace "sets" at each occurrence in the 1st paragraph of section 55-1.01C(2) with:

04-19-13

copies

AA

56 SIGNS

04-19-13

Delete item 2 in the list in the 4th paragraph of section 56-3.01A.

07-20-12

Replace "sets" in the 1st paragraph of section 56-3.01C(2) with:

copies

04-19-13

Delete the 7th paragraph of section 56-3.02K(2).

07-20-12

Delete item 4 in the list in the 1st paragraph of section 56-3.02M(1).

07-20-12

Replace item 5 in the list in the 1st paragraph of section 56-3.02M(1) with:

Tubular

04-19-13

Add between the 1st and 2nd paragraphs of section 56-3.02M(1):

04-19-13

Clean and paint all ferrous metal parts of tubular sign structures after galvanizing, including the areas to be covered by sign panels. Do not paint sign structures other than tubular type unless specified in the special provisions.

Replace the headings and paragraphs in section 56-3.02M(3) with:

Where specified, clean and paint sign structures under section 59-5.

04-19-13

Delete "and box beam-closed truss" in the 2nd paragraph of section 56-3.02M(3)(a).

07-20-12

AA

57 WOOD AND PLASTIC LUMBER STRUCTURES

04-19-13

Replace "51-2.01C(3)" in the 1st paragraph of section 57-2.01C(3)(a) with:

57-2.01C(3)

10-19-12

Replace "sets" at each occurrence in the 1st paragraph of section 57-3.01C with:

copies

04-19-13

AA

58 SOUND WALLS

04-19-13

Delete the 3rd paragraph of section 58-1.01.

10-19-12

Replace the 1st paragraph of section 58-2.01D(5)(a) with:

08-05-11

You must employ a special inspector and an authorized laboratory to perform Level 1 inspections and structural tests of masonry to verify the masonry construction complies with section 1704, "Special Inspections," and section 2105, "Quality Assurance," of the 2007 CBC.

Delete the 1st paragraph of section 58-2.02F.

10-19-12

Replace "sets" at each occurrence in the 1st paragraph of section 58-4.01C with:

04-19-13

copies

AA

59 PAINTING

04-19-13

Replace "SSPC-SP 10" at each occurrence in section 59 with:

10-19-12

SSPC-SP 10/NACE no. 2

Replace "SSPC-SP 6" at each occurrence in section 59 with:

10-19-12

SSPC-SP 6/NACE no. 3

Replace "SSPC-CS 23.00" at each occurrence in section 59 with:

10-19-12

SSPC-CS 23.00/AWS C 2.23M/NACE no. 12

Replace "SSPC-QP 3 or AISC SPE, Certification P-1 Enclosed" in item 3 in the list in the 1st paragraph of section 59-2.01D(1) with:

10-19-12

AISC-420-10/SSPC-QP 3 (Enclosed Shop)

Replace the paragraphs in section 59-2.03A with:

10-19-12

Clean and paint all exposed structural steel and other metal surfaces.

You must provide enclosures for cleaning and painting structural steel. Cleaning and painting of new structural steel must be performed in an Enclosed Shop as defined in AISC-420-10/SSPC-QP 3. Maintain atmospheric conditions inside enclosures within specified limits.

Except for blast cleaning within closed buildings, perform blast cleaning and painting during daylight hours.

Replace item 1 in the list in the 2nd paragraph of section 59-2.03C(1) with:

10-19-12

1. Apply a stripe coat of undercoat paint on all edges, corners, seams, crevices, interior angles, junctions of joining members, weld lines, and similar surface irregularities. The stripe coat must completely hide the surface being covered. If spot blast cleaning portions of the bridge, apply the stripe coat of undercoat paint before each undercoat and follow with the undercoat as soon as practical. If removing all existing paint from the bridge, apply the undercoat first as soon as practical and follow with the stripe coat of undercoat paint for each undercoat.

Replace the heading of section 59-2.03C(2) with:

04-19-13

Zinc Coating System

Add to section 59-2.03C(2)(a):

04-19-13

Coatings for new structural steel and connections between new and existing structural steel must comply with the requirements shown in the following table:

Zinc Coating System		
Description	Coating	Dry film thickness (mils)
All new surfaces:		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat ^a	Exterior grade latex ^b , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14
Connections to existing structural steel: ^c		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat ^a	Exterior grade latex ^b , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14

^aIf no finish coats are described, a final coat of inorganic zinc primer is required.

^bExterior grade latex must comply with section 91-2.02 unless otherwise specified.

^cIncludes the following locations:

1. New and existing contact surfaces
2. Existing member surfaces under new HS bolt heads, nuts, or washers
3. Bare surfaces of existing steel after trimming, cutting, drilling, or reaming
4. Areas within a 4-inch radius from the point of application of heat for welding or flame cutting

Add to section 59-2.03C:

04-19-13

59-2.03C(3) Moisture-Cured Polyurethane Coating System

Reserved

59-2.03C(4) State Specification Paint Waterborne Coating System**59-2.03C(4)(a) General**

The State Specification PWB coating system for existing structural steel must comply with the requirements shown in the following table:

State Specification PWB Coating System

Surface	Description	State Specification PWB Coating	Dry film thickness (mils)
Surfaces cleaned to bare metal ^a :	1st undercoat	145	2–3
	2nd undercoat	146	2–3
	1st finish coat	171	1.5–3
	2nd finish coat	172	1.5–3
	Total thickness, all coats	--	7–12
Existing painted surfaces to be topcoated:	Undercoat	146	2–3
	1st finish coat	171	1.5–3
	2nd finish coat	172	1.5–3
	Total thickness, new coats	--	5–9

^aIncludes locations of spot blast cleaning

59-2.03C(4)(b) Finish Coats

Pressure rinse undercoated surfaces to receive finish coats. Perform pressure rinsing no sooner than 72 hours after the final application of undercoat.

The 1st finish coat must be applied within 48 hours of pressure rinsing.

Apply the 1st finish coat in 2 applications. The 1st application consists of a spray-applied mist application. Apply the 2nd application after the mist application has dried to a set-to-touch condition as determined using the procedure in section 7 of ASTM D 1640.

Apply the 2nd finish coat after the 1st finish coat has dried 12 hours unless authorized. You may apply the 2nd finish coat in a single application.

Add to section 59-5.01:

04-19-13

Where specified, prepare and paint sign structures under sections 59-2 and 59-3.

Instead of submitting proof of the certification complying with SSPC-QP 1, you may submit documentation with the painting quality work plan showing compliance with the requirements in section 3 of SSPC-QP 1.

Instead of submitting proof of the certification complying with SSPC-QP 2, you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 4.2 through 4.4 of SSPC-QP 2, Category A.

Instead of submitting proof of the certification complying with AISC-420-10/SSPC-QP 3 (Enclosed Shop), you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 5 through 18 of AISC-420-10/SSPC-QP3.

Replace the paragraphs of section 59-5.03 with:

04-19-13

59-5.03A General

You may prepare and paint sign structures before or after erection. After erection, repair damaged paint to the satisfaction of the Engineer.

The total dry film thickness of finish coats on contact surfaces of galvanized HS bolted connections (1) must be from 1 to 4 mils and (2) may be applied in 1 application.

59-5.03B Undercoating of Ungalvanized Surfaces

Blast-cleaned surfaces must receive a single undercoat consisting of an inorganic zinc coating as specified in AASHTO M 300, Type I or Type II, except:

1. The first 2 sentences of section 5.6 do not apply
2. Section 5.6.1 does not apply

If you propose to use a coating that is not on the Authorized Material List, submit the required documentation specified in section 5.6 of AASHTO M 300. Allow 30 days for the Engineer's review.

59-5.03C Testing of Inorganic Zinc Coating

Perform adhesion and hardness testing no sooner than 72 hours after application of the single undercoat of inorganic zinc coating.

59-5.03D Finish Coating

The exposed area of inorganic zinc coating must receive a minimum of 2 finish coats of exterior grade latex paint.

The 1st finish coat color must match no. 24558 of FED-STD-595. The 2nd finish coat color must match no. 24491 of FED-STD-595. The total dry film thickness of the applications of the 2nd finish coat must be not less than 2 mils.

Replace "solider" in the 5th paragraph of section 59-9.03 with:

04-19-13

soldier

AA

**DIVISION VII DRAINAGE
62 ALTERNATIVE CULVERTS**

10-19-12

Add to the end of section 62-1.01:

10-19-12

Alternative culverts include concrete collars and concrete tees and reinforcement for connecting new pipe to existing or new facilities. Concrete for the collars and tees must be minor concrete. Reinforcement for the concrete collars or tee connections must comply with section 52.

AA

64 PLASTIC PIPE

10-19-12

Replace the 2nd paragraph of section 64-1.01A with:

10-19-12

Plastic pipe includes all necessary elbows, wyes, tees, other branches, fittings, coupling systems, concrete collars or tees, and reinforcement.

^^

65 CONCRETE PIPE

10-19-12

Replace the 2nd paragraph of section 65-1.01 with:

10-19-12

Concrete pipe includes all necessary elbows, wyes, tees, other branches, concrete collars or tees, and reinforcement.

^^

70 MISCELLANEOUS DRAINAGE FACILITIES

01-18-13

Replace section 70-5.02A(2) with:

01-20-12

70-5.02A(2) Plastic Flared End Sections

Plastic flared end sections must comply with ASTM D 3350.

Replace the 2nd, 3rd, and 4th paragraphs of section 70-7.02B with:

01-18-13

Before shipping, the exterior surfaces of the casing must be cleaned, primed, and coated to comply with ANSI/AWWA C213 or ANSI/AWWA C214.

Wrapping tape for repairing damaged coating and wrapping field joints and fittings must be a pressure-sensitive PVC or polyethylene tape with a minimum thickness of 50 mils, 2 inches wide.

Add to section 70-7.03:

01-18-13

Repair damaged coating on the casing and wrap field joints and fittings with wrapping tape as follows:

1. Before wrapping, thoroughly clean and prime the pipe casing, joints, and fittings under the tape manufacturer's instructions.
2. Wrap the tape tightly with 1/2 uniform lap, free from wrinkles and voids to provide not less than a 100-mil thickness.
3. Wrapping at joints must extend at least 6 inches over adjacent pipe casing coverings. Apply tension such that the tape will conform closely to contours of the joint.

^^

DIVISION VIII MISCELLANEOUS CONSTRUCTION

72 SLOPE PROTECTION

01-18-13

Replace the row under "Class" in the table in the 1st paragraph of section 72-3.02B with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble
-------	-------	-------	--------	--------

Replace the row under "Rock class" in the table in the 2nd paragraph of section 72-3.03E with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble
-------	-------	-------	--------	--------

Add to section 72-11.01B:

01-18-13

Expanded polystyrene and premolded expansion joint filler must comply with section 51-2.

Replace the 1st paragraph of section 72-11.01C(2) with:

01-18-13

Construct and finish minor concrete slope paving under section 51-1.

AA

74 PUMPING EQUIPMENT AND CONTROLS

04-19-13

Replace the 1st paragraph of section 74-1.01C(3) with:

04-19-13

Submit at least 5 copies of product data to OSD, Documents Unit. Each copy must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two copies will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

Replace the 1st sentence of the 1st paragraph in section 74-2.01D(2) with:

01-20-12

Drainage pumps must be factory certified under ANSI/HI 14.6.

AA

75 MISCELLANEOUS METAL

04-19-13

Add between 2nd and 3rd paragraphs of section 75-1.03A:

04-19-13

Fabricate expansion joint armor from steel plates, angles, or other structural shapes. Shape the armor to the section of the concrete deck and match-mark it in the shop. Bevel the unbolted end of the checkered

plate at 45 degrees. Straighten warped sections of expansion joint armor before placing. Secure the expansion joint armor in the correct position during concrete placement.

Replace "SSPC-QP 3" in the 3rd paragraph of section 75-1.03E(4) with:

AISC-420-10/SSPC-QP3

10-19-12

AA

Replace section 78 with:

78 INCIDENTAL CONSTRUCTION

07-20-12

78-1 GENERAL

Section 78 includes specifications for incidental bid items that are not closely associated with other sections.

78-2-78-50 RESERVED

AA

80 FENCES

10-19-12

Add to section 80-2.02D:

Vertical stays must:

1. Comply with ASTM A641
2. Be 12-1/2 gage
3. Have a Class 3 zinc coating

10-19-12

Replace item 1 in the list in section 80-2.02E with:

Comply with ASTM A 116, Type Z, Grade 60, Class 1

10-19-12

Add after "galvanized wire" in the 1st paragraph of section 80-2.02F:

complying with ASTM A 641

10-19-12

Replace the 3rd and 4th paragraphs of section 80-2.02F with:

Each staple used to fasten barbed wire and wire mesh fabric to wood posts must:

1. Comply with ASTM F 1667
2. Be at least 1-3/4 inches long
3. Be manufactured from 9-gage galvanized wire

10-19-12

Replace the 8th through 14th paragraphs of section 80-2.03 with:

Add to "≤ 6" in the table in the 4th paragraph of section 80-3.02B:

[illegible]

DIVISION IX TRAFFIC CONTROL FACILITIES
83 RAILINGS AND BARRIERS

10-19-12

Replace "80-2.02" in the 2nd paragraph of section 83-1.02E with:

10-19-12

80-3.02B

Add to section 83-2.02D(1):

10-21-11

For a concrete barrier transition:

1. Remove portions of the existing concrete barrier where shown under section 15-3
2. Roughen the contact surface of the existing concrete barrier
3. Drill and bond dowels into the existing concrete barrier under section 51-1

Add to section 83-2.02:

10-19-12

83-2.02H–83-2.02M Reserved

^^

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

01-20-12

Replace the 1st paragraph in section 84-2.04 with:

01-20-12

A double extruded thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 2 traffic stripes.

A double sprayable thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 1 traffic stripe.

Add to section 84:

01-20-12

84-6 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS WITH ENHANCED WET NIGHT VISIBILITY

Reserved

84-7–84-10 RESERVED

^^

86 ELECTRICAL SYSTEMS

10-19-12

Replace section 86-2.06 with:

01-20-12

86-2.06 PULL BOXES

86-2.06A General

86-2.06A(1) Cover Marking

Marking must be clearly defined, uniform in depth, and parallel to either the long or short sides of the cover.

Marking letters must be 1 to 3 inches high.

Before galvanizing steel or cast iron cover, apply marking by one of the following methods:

1. Use cast iron strip at least 1/4 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover with 1/4-inch flathead stainless steel machine bolts and nuts. Peen bolts after tightening.
2. Use sheet steel strip at least 0.027 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover by spot welding, tack welding, or brazing, with 1/4-inch stainless steel rivets or 1/4-inch roundhead stainless steel machine bolts and nuts. Peen bolts after tightening.
3. Bead weld the letters on cover such that the letters are raised a minimum of 3/32 inch.

86-2.06A(2) Installation and Use

Space pull boxes no more than 200 feet apart. You may install additional pull boxes to facilitate the work.

You may use a larger standard size pull box than that shown on the plans or specified.

A pull box in ground or sidewalk area must be installed as follows:

1. Embed bottom of the pull box in crushed rock.
2. Place a layer of roofing paper on the crushed rock.
3. Place grout over the layer of roofing paper. Grout must be 0.50 to 1 inch thick and sloped toward the drain hole.
4. Make a 1-inch drain hole in the center of the pull box through the grout and roofing paper.
5. Place grout between the pull box and the pull box extension, and around conduits.

The top of the pull box must be flush with the surrounding grade or the top of an adjacent curb, except in unpaved areas where the pull box is not immediately adjacent to and protected by a concrete foundation, pole, or other protective construction. Place the pull box 1-1/4 inches above the surrounding grade. Where practical, place a pull box shown in the vicinity of curbs or adjacent to a standard on the side of the foundation facing away from traffic. If a pull box is installed in a sidewalk area, adjust the depth of the pull box so that the top of the pull box is flush with the sidewalk.

Reconstruct the sump of an existing pull box if disturbed by your activities. Remove old grout and replace with new if the sump was grouted.

86-2.06B Non-Traffic-Rated Pull Boxes

Reserved

86-2.06C Traffic Pull Boxes

Traffic pull box and cover must comply with ASTM C857, "Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures," for HS20-44 loading. You must be able to place the load anywhere on the box and cover for 1 minute without causing cracks or permanent deformations.

Frame must be anchored to the box with 1/4 by 2-1/4 inch concrete anchors. Four concrete anchors must be included for No. 3-1/2(T) pull box; one placed in each corner. Six concrete anchors must be included for No. 5(T) and No. 6(T) pull boxes; one placed in each corner and one near the middle of each of the longer sides.

Nuts must be zinc-plated carbon steel, vibration resistant, and have a wedge ramp at the root of the thread.

After installation of traffic pull box, install the steel cover and keep it bolted down when your activities are not in progress at the pull box. When the steel cover is placed for the final time, the cover and Z bar frame must be cleaned of debris and tightened securely.

Steel cover must be countersunk approximately 1/4 inch to accommodate the bolt head. When tightened, the bolt head must not exceed more than 1/8 inch above the top of the cover.

Concrete placed around and under traffic pull boxes must be minor concrete.

Replace "project" in the 3rd paragraph of section 86-2.11A with:

10-19-12

work

Replace "Contract" in item 2 in the list in the 11th paragraph of section 86-2.11A with:

10-19-12

work

AA

88 GEOSYNTHETICS

01-18-13

Replace the row for hydraulic bursting strength in the table in the 2nd paragraph of section 88-1.02B with:

10-19-12

Puncture strength, lb min	ASTM D 6241	310
Trapezoid tearing strength, lb min	ASTM D 4533	56

Replace the 3rd paragraph in section 88-1.02C with:

10-19-12

Geocomposite wall drain must be from 0.25 to 2 inches thick.

Replace the value for permittivity of woven fabric in the table in the 1st paragraph of section 88-1.02E with:

01-20-12

0.05

Replace the value for apparent size opening of nonwoven fabric in the table in the 1st paragraph of section 88-1.02E with:

01-20-12

0.012

Replace the table in the 1st paragraph of section 88-1.02G with:

01-20-12

Sediment Filter Bag

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	250
Apparent elongation, percent min, in each direction	ASTM D 4632	10	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	100-200	75-200
Permittivity, sec ⁻¹ min	ASTM D 4491	1.0	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace the table in the 1st paragraph of section 88-1.02H with:

01-20-12

Temporary Cover

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	200
Apparent elongation, percent min, in each direction	ASTM D 4632	15	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	4-10	80-120
Permittivity, sec ⁻¹ min	ASTM D 4491	0.05	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace section 88-1.02P with:

01-18-13

88-1.02P Biaxial Geogrid

Geosynthetics used for biaxial geogrid must be a punched and drawn polypropylene material formed into an integrally formed biaxial grid. When tested under the referenced test methods, properties of biaxial geogrid must have the values shown in the following table:

Biaxial Geogrid

Property	Test	Value
Aperture size, inch ^a min and max	Calipered	0.8-1.3 x 1.0-1.6
Rib thickness, inch min	Calipered	0.04
Junction thickness, inch min	Calipered	0.150
Tensile strength, 2% strain, lb/ft ^a min	ASTM D 6637	410 x 620
Tensile strength at ultimate, lb/ft ^a min	ASTM D 6637	1,310 x 1,970
Ultraviolet resistance, percent min retained tensile strength, 500 hours	ASTM D 4355	100
Junction strength, lb/ft ^a min	ASTM D 7737	1,220 x 1,830
Overall flexural rigidity, mg-cm min	ASTM D 7748	750,000
Torsional rigidity at 20 cm-kg, mm-kg/deg ^b min	GRI:GG9	0.65

^aMachine direction x cross direction

^bGeosynthetic Research Institute, Test Method GG9, *Torsional Behavior of Bidirectional Geogrids When Subjected to In-Plane Rotation*

AA

DIVISION X MATERIALS

90 CONCRETE

08-05-11

Replace the 3rd paragraph of section 90-1.01C(7) with:

08-05-11

Submit weighmaster certificates in printed form or, if authorized, in electronic media. Present electronic media in a tab-delimited format on a CD or DVD. Captured data for the ingredients represented by each batch must be line feed carriage return and one line separate record with sufficient fields for the specified data.

Replace the 3rd paragraph of section 90-3.01C(5) with:

08-05-11

Production data must be input by hand into a pre-printed form or captured and printed by the proportioning device. Present electronic media containing recorded production data in a tab-delimited format on a CD or DVD. Each capture of production data must be followed by a line feed carriage return with sufficient fields for the specified data.

AA

91 PAINT

10-19-12

Add to section 91-2:

10-19-12

91-2.03 MOISTURE-CURED POLYURETHANE COATING

Reserved

Replace "saint" in the 1st paragraph of section 91-4.05 with:

10-19-12

paint

^^

92 ASPHALTS

01-20-12

Replace the row for dynamic shear for original binder in the table in the 1st paragraph of section 92-1.02B with:

01-20-12

Dynamic shear, Test temperature at 10 rad/s, °C min G*/sin(delta), kPa max G*/sin(delta), kPa	T 315	58 1.00 2.00	64 1.00 2.00	64 1.00 2.00	64 1.00 2.00	70 1.00 2.00
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